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RAILWAY

L OCOMOTIVES AND CARS

SEPTEMBER 1954

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Electrical Engineer

Low-Grade
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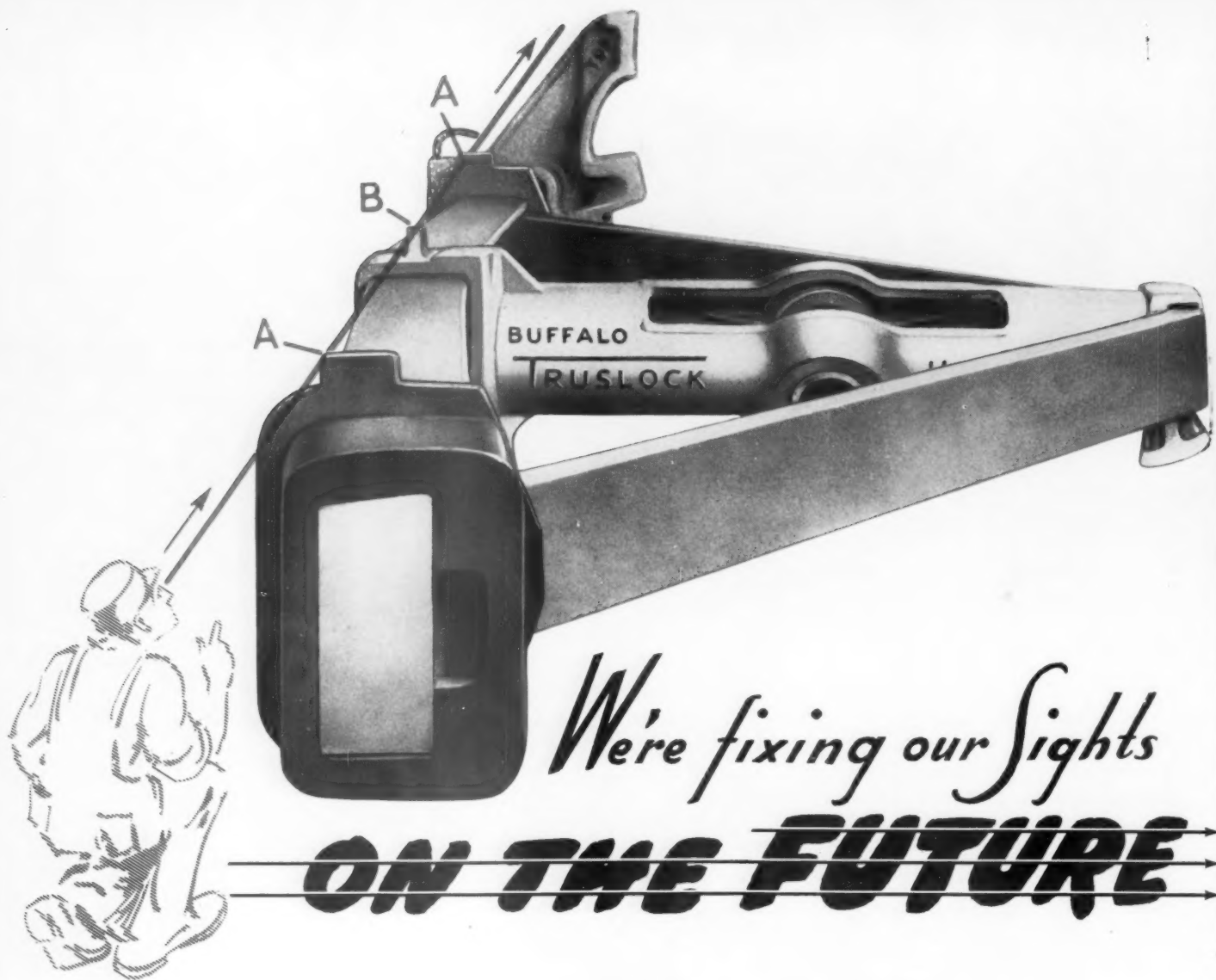
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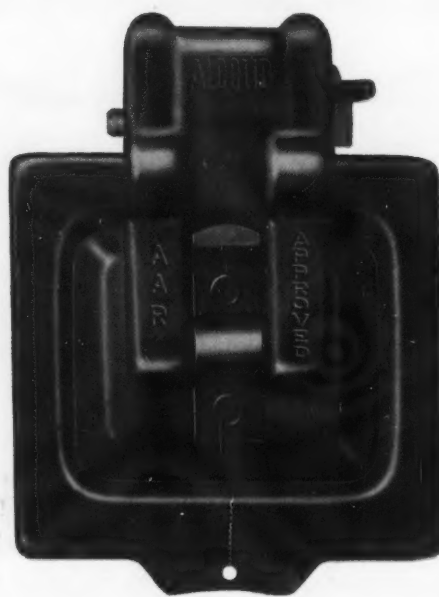
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Sales and Service Offices in Principal Cities

September, 1954

VOLUME 128

No. 9

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal.

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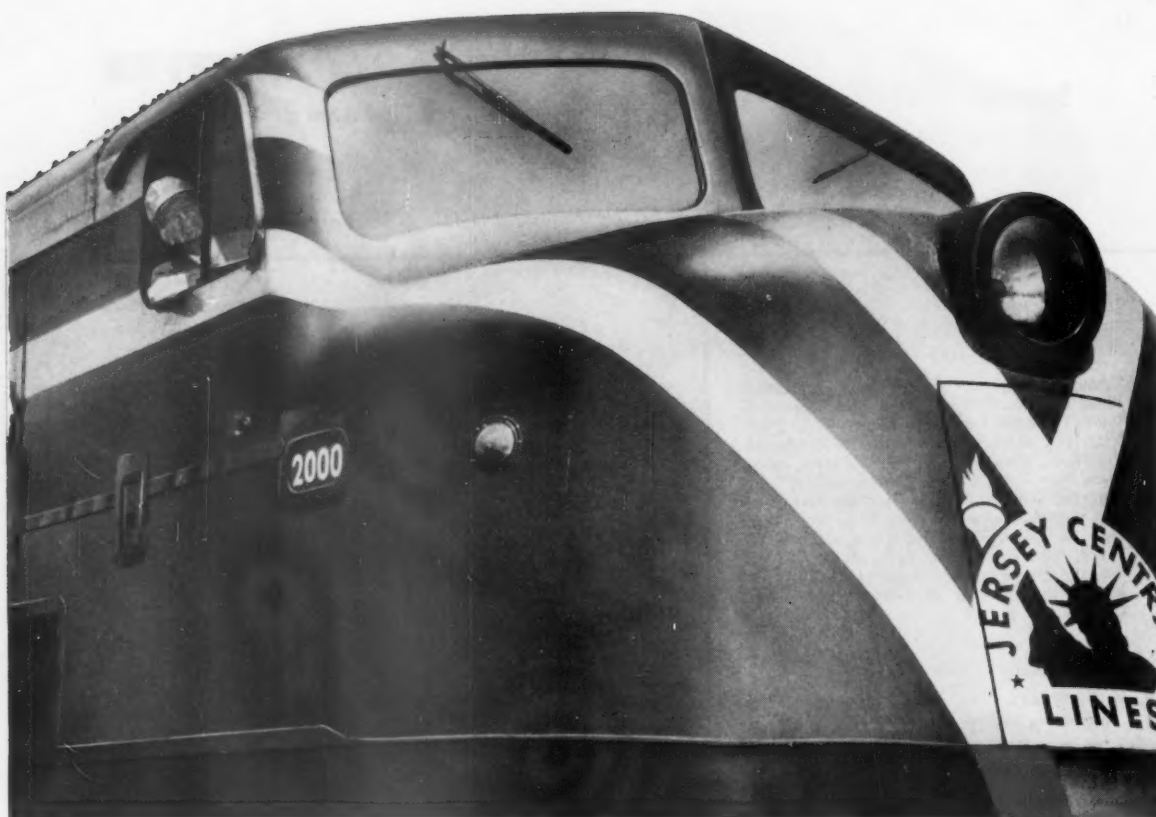
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PRINTED BY PERIODICAL PRESS CORP., PHILA. 23, PA.



"Old 592," distinguished veteran of Jersey Central's famous Blue Comet run between New York and Atlantic City, was built in 1901. This Atlantic-type (4-4-2) Camelback had 75" drivers and several times topped 100 mph between New York and Philadelphia. She now rests in glory at the B&O Museum in Baltimore.



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ARACAR—journal box oils
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lubricant
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DIOL RD—Diesel lube oil

COBLAX—traction motor
gear lube
VARSOL—Stoddard Solvent
SOLVESSO—Aromatic
solvent
ESSO Weed Killer
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NEWS . . .



Santa Fe Tests "Hi-Level" Coaches

Budd-built coaches of a wholly new design will be tried in long distance service on the Santa Fe. All revenue seats are in the upper level which runs the entire length of each car. Each coach accommodates 67, with no change in seat spacing from the road's standard streamline coaches which seat 44 to 48. Passengers enter from cen-

ter doors (one on each side) on the lower level. Baggage storage space and rest rooms are in the lower section. Service equipment, such as air-conditioning equipment, auxiliary power generators and batteries is housed in the ends of the car over the trucks. The cars are 85 ft long and ride on four-wheel trucks equipped with outside swing hangers.

The floor of the upper level is 8 ft 7 in. above the rails, and the center aisle is depressed to give added head room. A stairway connects the lower level with the main passenger compartment, the "outer end" of which has a stairway down to the conventional level to permit coupling with existing equipment. More details will appear in a description in a later issue.

ASME Honors Oatley

Henry Bigelow Oatley, retired mechanical and consulting engineer, has been elected to honorary membership in the American Society of Mechanical Engineers. The rank, awarded for "acknowledged eminence in the engineering field," is the highest honor conferred by ASME. It was bestowed on Mr. Oatley for his achievements "in the field of steam generation and use in locomotives and for his services to the engineering profession and to the general public." Mr. Oatley, from 1910 until his retirement in 1950, was with the Superheater Company, where he became chief engineer, vice-president and consulting engineer.

ODM Establishes Advisory Group on Rolling Stock

Director Arthur S. Flemming of the Office of Defense Mobilization has established a Consultant Committee on Railroad Rolling Stock. It will "assist ODM in evaluating requirements for rolling stock under full mobilization conditions," the announcement said. Subcommittees will consider requirements for an adequacy of freight cars, passenger equipment, locomotives, tank cars and "shortline equipment."

Chairman of the group is Captain Granville Conway, president of Cosmopolitan Shipping Company, New York. Other members are:

W. C. Baker, vice-president, Baltimore & Ohio.
A. E. Baylis, vice-president, New York Central.
Andrew H. Brown, president, National Industrial Traffic League.
A. W. Campbell, general superintendent of transportation, Great Northern.
J. L. Cooke, general superintendent of transportation, Seaboard Air Line.
H. W. Hale, general superintendent of transportation, St. Louis-San Francisco.
James F. Haley, manager Traffic and Transportation Department, Koppers Company.
J. M. Hood, president, American Short Line Railroad Association.
Richard H. Lamberton, manager Tank and Welding Division, General American Transportation Corporation.

John N. Lind, president, National Association of Shippers Advisory Boards.

P. J. Lynch, vice-president, Union Pacific.

A. F. McIntyre, chief of freight transportation, Pennsylvania.

J. E. McLeod, chief mechanical officer, Chesapeake & Ohio.

J. J. Mahoney, general superintendent of transportation, Santa Fe.

F. J. Orner, general manager, New Haven.

R. C. Parsons, vice-president, Louisville & Nashville.

J. C. Rill, president, Fruit Growers Express.

George H. Shafer, general traffic manager, Weyerhaeuser Sales Company.

Robert DePuy is secretary of the committee. Representatives of the Department of Defense and Defense Transport Administration will be added.

AAR Bulletins

Mechanical Division

JOURNAL-BOX REPACKING EXTENDED THREE MONTHS

As a result of recent letter ballot returns tabulated by the Mechanical Division, Interchange Rules 3, 9 and 66 have been modified so as to add three months to the present journal-box repacking periods for

freight cars. The definition and designating letters for freight cars as shown in Section L of the Manual have also been amended to include reference covering a new type freight car having removable superstructure.

JOURNAL REPACKING ON 36-MO. BASIS

Just issued is a detailed list of journal-box repacking dates for 50 Pennsylvania 70-ton hopper cars equipped with Plypak waste containers and authorized for extension of the repacking period to 36 months as a matter of test.

These cars were equipped with Plypak containers between July 1951 and January 1952; the repack extension period to 36 months was authorized in May 1954, and the new repacking dates, therefore, range from July 1954 to January 1955.

As these cars are repacked by AAR member roads, it is requested that M. A. Pinney, engineer of tests, Pennsylvania be notified of the car number, the condition

(Continued on page 8)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE AUGUST ISSUE

FREIGHT-CAR ORDERS			
Road	No. of cars	Type of car	Builder
Chicago & Illinois Midland	150 ¹	50-ton box	ACF Industries
Delaware, Lackawanna & Western	500 ²	50-ton box	ACF Industries
	500	50-ton box	Magor Car
Great Northern	25 ³	70-ton gondola	Company shops
Nevada Northern	4 ⁴	Caboose	Rail & Indus. Equip.
Toledo, Peoria & Western	4 ⁵	Caboose	Company shops
Western Maryland	50	PS-2 covered hopper	Pullman-Standard
FREIGHT-CAR INQUIRIES			
Southern Pacific	500	50-ton automobile box	
Union Pacific	500	50-ton box	
	300	50-ton tank	
	200	70-ton tank	

¹ Delivery scheduled for first quarter of 1955.

² Approximate cost of the 1,000 cars, \$7,000,000.

³ Cost, approximately \$195,000.

⁴ For delivery this year.

⁵ One already in service.

Deliveries to start in the fall. Cars to be lined with

**“Windows” Mean
Adlake
Breather Windows
TO ALL
American Railroads**



...and here are the reasons why:

Railroad Managements Know...that on an overall cost and operation basis, ADLAKE Windows are the most economical on the market. They literally pay for themselves by reducing service expenses throughout their long life. Their "passenger appeal" is a valuable plus that pays off in passenger traffic.

Mechanical Officials Know...that today, ADLAKE "Breather" windows installed nearly 20 years ago are as good as new...that they require no maintenance other than routine washing...keep their good looks and perfect seal indefinitely!

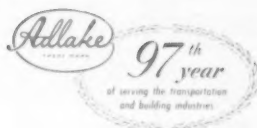
Maintenance Men Know...that in an ADLAKE Window, glass which has been broken in service can be

replaced right on the railroad's own property...and that with the ADLAKE "Breather" unit their window troubles are at an end.

Traffic Executives Know...that passengers want to see the scenery their railroad advertises. And passengers *always will* see it clearly, regardless of changes in temperature, altitude or humidity, when they are looking through an ADLAKE "Breather" Window.

THE ADLAKE "BREATHER" WINDOW

...is the result of 97 years of designing and manufacturing experience produced by skilled and experienced personnel in a plant covering more than 10 acres. Don't settle for less than ADLAKE...the original "Breather" Window!



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Established 1857 • ELKHART, INDIANA • New York • Chicago

Manufacturers of ADLAKE Specialties and Equipment for the Railway Industry

of the containers, packing, journal bearings and lubrication.

*Operating-Transportation Division,
Freight Loss and Damage Prevention
Section*

CLEANING AND UPGRADING CARS

To intensify efforts to properly clean and up-grade cars furnished for flour and other food products, the Committee on Weevil Infestation at a recent meeting suggested that member lines be reminded of the importance of these operations. The committee called specific attention to W.T.L. Tariff No. 330-0, Item 40, which contains the following provision:

"For loading flour and other grain products, the carrier will furnish suitable cars with tight roofs and sidings and with interior free of debris and noxious odors, oil spots or acid spots likely to damage the lading, also reasonably free from protruding nails and projections likely to tear the sacks."

The committee also called attention to the activities of some carriers to maintain regular cleaning tracks or portable car-cleaning equipment. One terminal line in St. Louis, it said, and one in Chicago, have recently provided cleaning tracks, and another Chicago terminal line is planning one. Another carrier has built a portable cleaning plant, using a 12,000-15,000-gal motor-truck tank with hose, detergent container, etc. This six-man operation is capable of cleaning approximately 50 box cars daily. According to the carrier, it is economical and cars can in some areas be cleaned more expeditiously by this method than on regular cleaning tracks.

**H. E. Kaye Heads
Roller Bearing Committee**

H. E. Kaye, assistant chief engineer, Rollway Bearing Company, Syracuse, has been named chairman for the next year of the Roller Bearing Engineering Committee, Anti-Friction Bearing Manufacturers Association. His election took place at the annual meeting of the association, May 19-21, at Rye, New York.

Together with the Annual Bearing Engineering Committee, Mr. Kaye's committee will administer an industry-wide program to standardize the limits, capacities and other engineering characteristics of anti-friction bearings.

Grossman Nomination Withdrawn

President Eisenhower has withdrawn from the Senate his nomination of Charles H. Grossman for permanent appointment as director of locomotive inspection, Interstate Commerce Commission.

Mr. Grossman has been serving in the position since September 1953, first under a recess appointment and then under the withdrawn nomination which was submitted to the Senate last February. Mr. Grossman has returned to his former position as district inspector at Albuquerque, N.M., and the Washington office is in charge of the assistant director, James E. Friend.

It is understood that President Eisen-

hower withdrew the Grossman nomination to go along with the commission's reorganization plans which are predicated in part on proposed amendments to the Locomotive Inspection Act (see page 9, July issue). The proposed amendments are embodied in Senate Bill 3059, and they would eliminate provisions under which the director and assistant directors of locomotive inspection are appointed by the President. The Senate Committee on Interstate and Foreign Commerce held hearings on the bill but has taken no further action.

In announcing a reorganization step which merged its former Bureau of Locomotive Inspection into the new Bureau of Safety and Service, the commission said some of the efficiency and economy hoped for would depend upon favorable Congressional action on S. 3059.

**Pipe Coupling—
A Correction**

The Utility Clamp & Equipment Co., 108 East 6th street, Los Angeles 14, whose name was omitted on page 98 of the July issue, is marketing the compression pipe coupling described thereon.

**American Welding Society
To Meet in November**

Fifty-seven papers covering all phases of welding activities will be presented at the National Fall Meeting of the American Welding Society to be held in Chicago, November 1 to 5. The meeting will run concurrently with the National Metals Exposition at which welding and cutting exhibits and demonstrations will be shown.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.	Month of May		5 months ended with May	
	1954	1953	1954	1953
3 Road locomotive miles (000) (M-211):				
3-05 Total, steam.....	5,784	12,357	32,365	62,454
3-06 Total, Diesel-electric.....	33,335	32,167	158,309	152,355
3-07 Total, electric.....	670	759	3,232	3,716
3-04 Total, locomotive-miles.....	39,918	45,352	194,355	218,830
4 Car-miles (000,000) (M-211):				
4-03 Loaded, total.....	1,555	1,737	7,391	8,260
4-06 Empty, total.....	908	952	4,334	4,476
6 Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01 Total in coal-burning steam locomotive trains.....	12,164	23,167	62,910	111,348
6-02 Total in oil-burning steam locomotive trains.....	1,995	5,867	10,710	28,730
6-03 Total in Diesel-electric locomotive trains.....	94,151	91,781	456,479	426,413
6-04 Total in electric locomotive trains.....	2,098	2,225	9,902	10,523
6-06 Total in all trains.....	110,871	123,277	521,597	578,079
10 Averages per train-mile (excluding light trains) (M-211):				
10-01 Locomotive-miles (principal and helper).....	1.02	1.03	1.02	1.03
10-02 Loaded freight car-miles.....	41.70	41.50	40.70	40.90
10-03 Empty freight car-miles.....	24.40	22.80	23.90	22.20
10-04 Total freight car-miles (excluding caboose).....	66.10	64.30	64.60	63.10
10-05 Gross ton-miles (excluding locomotive and tender).....	2,976	2,948	2,873	2,864
10-06 Net ton-miles.....	1,318	1,346	1,265	1,296
12 Net ton-miles per loaded car-mile (M-211):	31.60	32.40	31.10	31.70
13 Car-mile ratios (M-211):				
13-03 Per cent loaded of total freight car-miles.....	63.10	64.60	63.00	64.90
14 Averages per train hour (M-211):				
14-01 Train miles.....	19.10	18.30	18.90	18.30
14-02 Gross ton-miles (excluding locomotive and tender).....	56,154	53,433	53,836	51,927
14 Car-miles per freight car day (M-240):				
14-01 Serviceable.....	43.00	46.80	41.80	45.40
14-02 All.....	40.60	44.60	39.60	43.20
15 Average net ton-miles per freight car-day (M-240):	809	934	776	888
17 Per cent of home cars of total freight cars on the line (M-240):	54.00	46.80	54.40	47.10

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3 Road motive-power miles (000):				
3-05 Steam.....	2,196	4,298	12,318	23,252
3-06 Diesel-electric.....	21,120	20,233	103,419	99,075
3-07 Electric.....	1,384	1,519	7,043	7,797
3-04 Total.....	24,702	26,051	122,781	130,125
4 Passenger-train car-miles (000):				
4-08 Total in all locomotive-propelled trains.....	244,709	260,243	1,223,114	1,306,741
4-09 Total in coal-burning steam locomotive trains.....	10,380	25,459	62,723	134,403
4-10 Total in oil-burning steam locomotive trains.....	8,638	13,909	40,114	72,783
4-11 Total in Diesel-electric locomotive trains.....	210,521	204,006	1,041,450	1,012,991
12 Total car-miles per train-mile.....	9.54	9.68	9.39	9.74

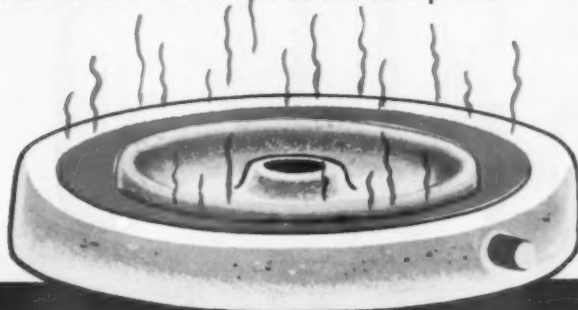
YARD SERVICE (DATA FROM I.C.C. M-215)

1 Freight yard switching locomotive-hours (000):				
1-01 Steam, coal-burning.....	305	608	1,616	3,014
1-02 Steam, oil-burning.....	51	106	262	560
1-03 Diesel-electric.....	3,281	3,498	16,268	16,930
1-06 Total.....	3,647	4,231	18,198	20,613
2 Passenger yard switching hours (000):				
2-01 Steam, coal-burning.....	12	20	65	108
2-02 Steam, oil-burning.....	4	7	21	32
2-03 Diesel-electric.....	253	257	1,273	1,283
2-06 Total.....	296	317	1,494	1,585
3 Hours per yard locomotive-day:				
3-01 Steam.....	4.50	6.70	4.70	6.50
3-02 Diesel-electric.....	14.70	16.20	15.00	16.30
3-05 Serviceable.....	14.10	14.80	14.40	14.70
3-06 All locomotives (serviceable, unserviceable and stored).....	12.00	13.10	12.30	12.90
4 Yard and train-switching locomotive-miles per 100 loaded freight car-miles.....	1.63	1.68	1.71	1.72
5 Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives).....	.75	.76	.76	.75

¹Excludes B and trailing A units.

tougher tests for a tougher wheel

the new AMCCW wheel proves it can take it
in the tests now in effect at all AMCCW plants



In this test, molten metal is poured around the tread of a cold wheel, setting up thermal strains similar to those encountered in prolonged braking. The slightest evidence of cracking disqualifies a wheel. Length of test time now increased 25%.

All AMCCW wheels are now being inspected on the basis of more severe test specifications, voluntarily adopted by the Association in February, 1953.

These same specifications have been adopted by the AAR, and are now official.

The tougher tests are a logical development of continuous improvement of AMCCW manufacturing methods and AMCCW wheels, resulting over the years in dramatic improvement in wheel performance... from 89,000,000 car miles per wheel failure in the five-year period 1938-42 to 128,600,000 car miles per wheel failure in the period of 1948-52!

Tougher tests like these assure continued advances in the years ahead.

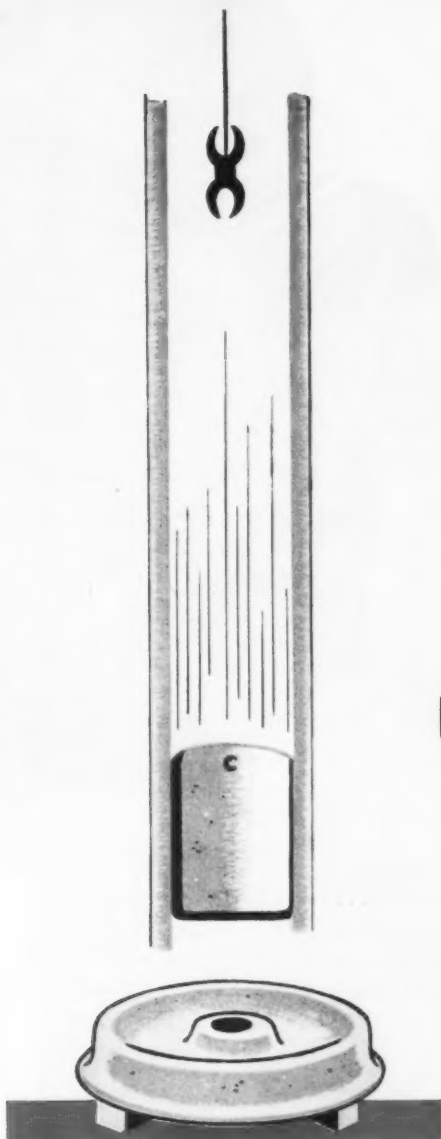
Association of Manufacturers of Chilled Car Wheels

445 North Sacramento Boulevard, Chicago 12, Ill.

Albany Car Wheel Co. • ACF Industries, Inc.

Marshall Car Wheel & Foundry Co. • Griffin Wheel Co.

Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)



Here a 250-pound tup is dropped on the hub of a wheel. Number of drops now increased 25%. Even so, it is a mighty rare occasion when the new AMCCW chilled car wheel breaks under this severe test.



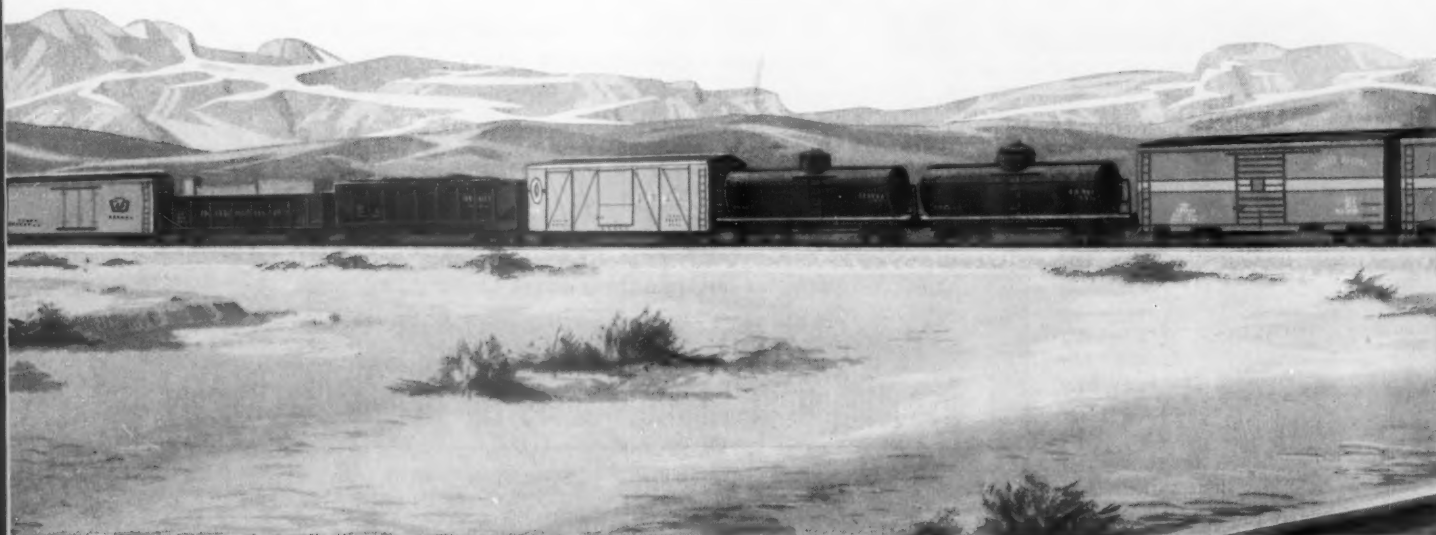
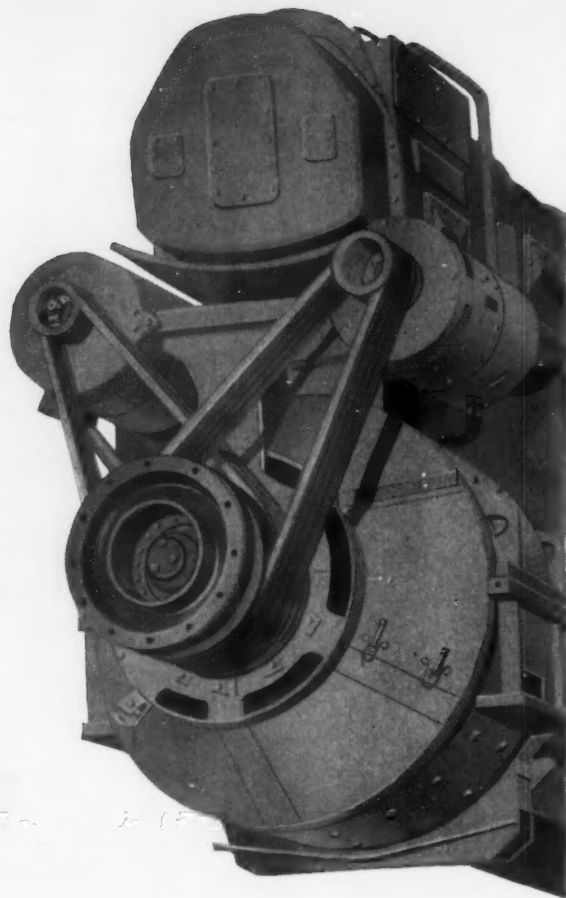
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FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS

PERSONAL MENTION

Chesapeake & Ohio

The *Chesapeake* and *Pere Marquette* Districts have been abolished and, with certain geographical changes, have been replaced by the Northern and Southern Regions.

J. E. McLEOD, chief mechanical officer of the former Chesapeake District, appointed chief mechanical officer, in charge of construction and maintenance of motive equipment and rolling stock for the entire road. Headquarter, Richmond, Va.

Chicago, Milwaukee, St. Paul & Pacific

ALFRED G. HOPPE, mechanical engineer has been named a Fellow of the American Society of Mechanical Engineers in recognition of his engineering attainments. Among these was his work in the pioneering development of all-welded passenger and freight cars.

Erie

G. E. LUND, assistant to superintendent of motive power at Cleveland, has retired.

Gulf, Mobile & Ohio

G. D. PITTMAN, general foreman at Louisville, Miss., appointed assistant master mechanic at Jackson, Tenn.

J. W. ROGERS, general mechanical inspector at Louisville, Miss., appointed general foreman.

C. E. WILSON, carman supervisor at New Orleans, appointed wrecker-car foreman at Louisville, Miss.

Great Northern

RICHARD H. RUSSELL appointed electrical engineer at St. Paul, Born: August 23, 1899, at Chicago. Education: Dickson



R. H. Russell

College, Carlisle, Pa. (1920-21); graduate of Massachusetts Institute of Technology (1924). Career: Western Electric Company, Chicago, (1924-26); Great Northern (beginning 1927).

Illinois Central

A. G. KANN has retired as general superintendent of motive power at Chicago, as noted in the August issue. Born: August 23, 1894. Career: Became a machinist apprentice on the IC at Waterloo, Ia., in 1911. Served, successively, as a machinist, assistant night roundhouse foreman, air brake foreman and gang foreman at Waterloo; general foreman at Council

Bluffs, Ia.; general foreman at Waterloo; master mechanic at Champaign, Ill.; master mechanic and general master mechanic at Waterloo; and general superintendent



A. G. Kann

equipment at Chicago. Appointed general superintendent of motive power in April 1954.

Minneapolis, St. Paul & St. Marie

F. JOHNSON, master mechanic at Minneapolis, has retired.

H. H. LINK, fuel supervisor at Minneapolis, appointed master mechanic at Minneapolis.

R. D. JOHNSON, traveling engineer at Fond du Lac, Wis., appointed fuel supervisor at Minneapolis.

New York Central

S. C. MORSE, appointed supervisor of diesel records at Cleveland.

Southern

EDWIN L. THOMPSON, appointed foreman car repairs at Danville, Va.

ODELL T. KESLER, appointed assistant foreman car repairs at Spencer, N.C.

Southern Pacific

WILLIAM G. REID, superintendent motive power at El Paso, Tex., has retired.

L. T. FIFE, master mechanic at San Francisco, has retired.

J. M. HOLT, general master car repairer at San Francisco, has retired.

FRANK KURZ, master mechanic at El Paso, appointed master mechanic at San Francisco.

O. H. GUTSCH, shop superintendent at El Paso, Tex., appointed master mechanic at El Paso.

Obituary

H. C. FISHER, who retired as superintendent of the car department of the Norfolk & Western at Roanoke, Va., in 1950, died on May 26.

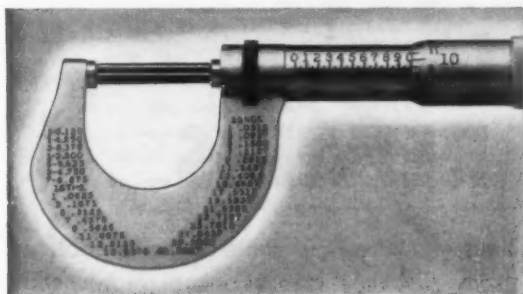
HUCO M. McINNIS, assistant superintendent motive power and equipment of the Chesapeake & Ohio, Pere Marquette district, died on June 9.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
May, 1951.....	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951.....	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951.....	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951.....	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951.....	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951.....	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951.....	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951.....	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952.....	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952.....	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952.....	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952.....	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952.....	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952.....	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952.....	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952.....	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952.....	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952.....	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952.....	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952.....	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953.....	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953.....	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953.....	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953.....	2,850,752,648	3,383	6,435	9,818	290,359
May, 1953.....	3,013,610,843	5,892	11,433	17,325	173,945
June, 1953.....	2,926,001,360	8,537	15,296	23,833	122,771
July, 1953.....	2,925,317,024	9,342	15,775	25,117	116,467
August, 1953.....	2,971,020,484	8,638	14,160	22,798	130,319
September, 1953.....	2,822,222,832	6,083	10,195	16,278	173,376
October, 1953.....	3,042,558,922	3,863	6,493	10,356	293,796
November, 1953.....	2,788,773,285	1,987	3,404	5,391	517,301
December, 1953.....	2,656,063,018	1,581	2,550	4,131	642,958
January, 1954.....	2,583,485,918	3,082	3,797	6,879	375,561
February, 1954.....	2,445,214,845	2,953	4,066	7,019	348,370
March, 1954.....	2,658,757,249	2,196	3,637	5,833	455,813
April, 1954.....	2,570,518,990	3,079	5,149	8,228	312,411
May, 1954.....	2,713,511,223	4,416	6,510	10,926	248,353



To function effectively, a spring pin must drive easily into holes drilled to normal production tolerances, compressing as driven. To drive easily, hold firmly and fit flush, the pin—*every* pin—must meet the strict requirements of specifications such as those prepared by the SAE and the Military Services.



Since failure of a pin can be as costly as a failure of any other precision part, it is important to check the pins *you* buy for uniformity... uniformity of diameter and length, shear strength, hardness, insertion and removal forces, and recovery of diameter.

**is as important
in the pin as in
the gear**

Rollpin has been tested many times—by many manufacturers—with a consistently high performance record. It has been widely recognized as the “quality” fastener of its type. In this case, quality can be—and should be—measured. We strongly urge that you test for quality when buying spring pins.



**ELASTIC STOP NUT CORPORATION
OF AMERICA**



Dept. R28-923, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

- ☐ Rollpin samples ☐ Here is a drawing of our product.
☐ Rollpin bulletin What self-locking fastener would you suggest?

Name _____ Title _____

Firm _____

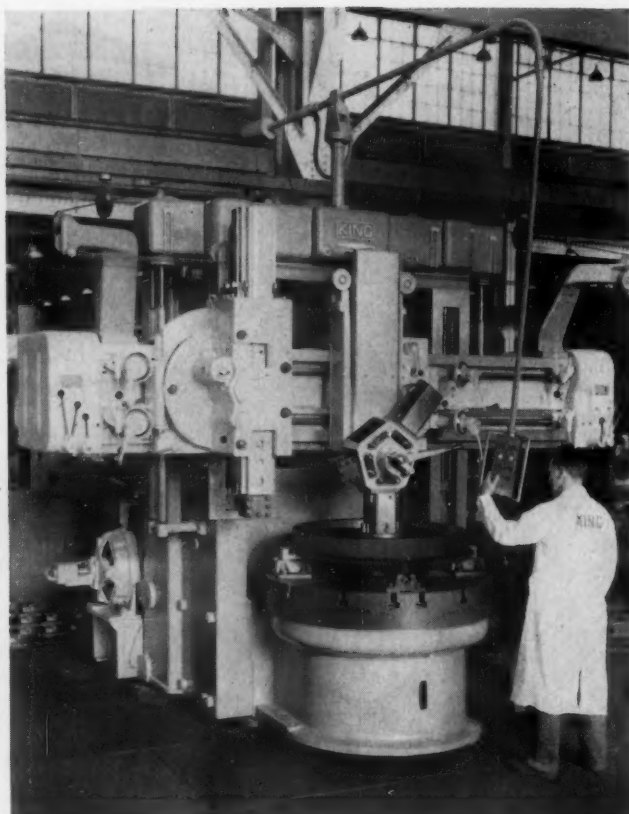
Street _____

City _____ Zone _____ State _____

New 52" KING, a modified-standard design for boring, facing and turning diesel locomotive wheels. Ten sizes available—30" to 144"—the widest size range among vertical mills

KING

VERTICAL BORING & TURNING MACHINES



--- LOWER THE COST of LOCOMOTIVE REPAIRS

To speed your maintenance schedules and get the highest availability from your locomotives, put new KING mills to work in your shops. You'll get rapid production, coupled with dependable accuracy, on a wide range of railroad jobs.

New KING mills have increased power and time-saving ease of operation. They are massive

machines, of extra-rigid construction, capable of taking the heaviest cuts at the highest speeds modern cutting tools can handle. Investigate these "top profit" machine tools for your modernized maintenance program.

Let your KING distributor show you the many features which lower locomotive repair costs!

American Steel Foundries

KING MACHINE TOOL DIVISION

1150 TENNESSEE AVENUE — CINCINNATI 29, OHIO

Rugged, long wearing

MOTOR WHEEL

Journal Box Lids



Attach without the use of tools

- 1 Full $\frac{3}{4}$ " bearing supports both ends of hinge pin, prevents worn holes, scoring of hinge pin.
- 2 Stops at ends of bearing hold straight hinge pin in position under spring pressure. NO FASTENING OR HAMMERING REQUIRED TO INSERT OR SECURE HINGE PIN.
- 3 Keeper pin holds assembly under pressure during shipment or storage. After hinge pin is inserted, hand pressure will remove keeper pin to complete assembly. NO TOOLS NEEDED.
- 4 Coil spring and roller assembly held snugly by two sheared ears. Roller operates freely over journal box lug preventing wear. Lid opens and closes easily.
- 5 Exclusive center construction permits full articulation on box face . . . up, down, right or left. Shear riveting and a series of press fits make articulation point oil-tight and permanent.
- 6 Heavy-gauge full pressed-steel construction.
- 7 Opens full 120° for easy access to journal.
- 8 Opening and closing strain eliminated from articulation point by extended housing arm.



Certified by A.A.R. to latest Spec. M-120-47

MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN, U.S.A.



National Railway Sales Representative
T-Z RAILWAY EQUIPMENT CO.

G. S. TURNER, President
8 South Michigan, Chicago 3, Illinois

Standard flange models have all the above features with the exception of the wider flange.



because of a new high in uniformity

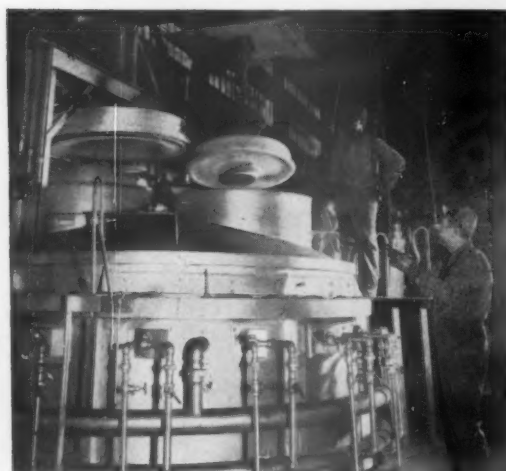
YOU GET A COMPLETE WITH ONLY



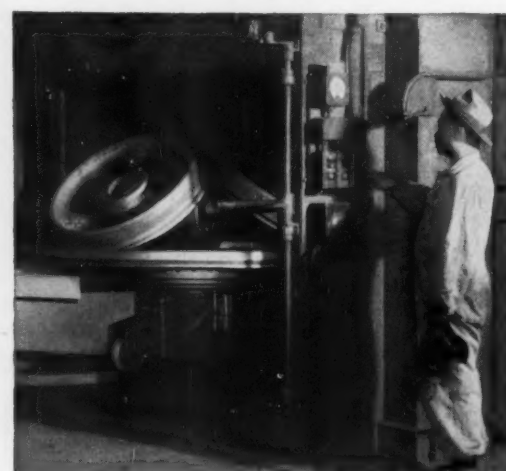
Graphite molds, machined to extremely close tolerances, are used in producing the Griffin EQS. Note clean appearance. Special silica spray also helps give wheel its fine finish.



Pressure-pouring and electric quality steel—two significant factors that assure complete filling of the mold with steel of closely controlled analysis.



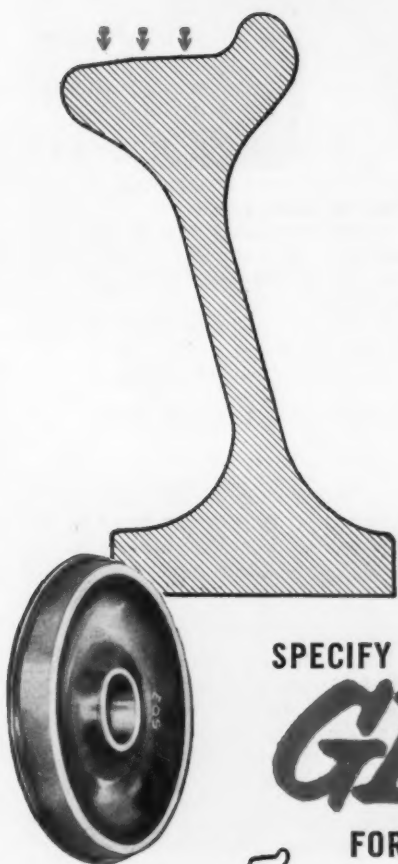
Normalizing in a temperature-controlled furnace, regulated to prevent decarburization. After removal, wheel is differentially control-cooled to room temperature.



Each Griffin EQS Steel Wheel is shot-blasted and given a 100% Magna-glo inspection. Taping for size completes its manufacture, and molds are immediately prepared for re-use.

CAR WHEEL INVENTORY 2 TAPE SIZES

when you specify the Griffin EQS



- All other dimensions accurate to .020" tolerance.
- Virtually perfect balance—as-cast.
- Excellent rotundity.
- Precision molds—plus shotblasting—result in clean, smooth appearance.
- 100% Magna-glo inspected.

SPECIFY THE

GRIFFIN EQS
ELECTRIC QUALITY STEEL

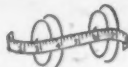
FOR A HIGHER RETURN ON YOUR WHEEL INVESTMENT



Greater Strength



Better Balance



Only 2 Tape Sizes



Precision Tolerances



Longer Wear



GRIFFIN WHEEL COMPANY • 410 N. Michigan Avenue, Chicago 11

Eleven modern plants—strategically located for service:

Tacoma • Los Angeles • Salt Lake City • Denver • St. Paul • Kansas City • Council Bluffs
Chicago • Detroit • Cincinnati • Boston



Famous Problems IN RAILROADING



The conductor of a 10 coach train, each coach 80 feet long, starts taking tickets from the back end of the train just as it pulls out of the terminal. If the train averages 60 miles an hour, and the conductor can go through a coach in 10 minutes, how far will he be from his starting point in one hour? How far will he be from his starting point in one hour if he starts at the front of the train?

See next month's Spicer Generator Drive advertisement for correct answer.

SOLUTION TO AUGUST PUZZLE:

A. 51,000 miles of rail is too much—by 5,250.417 feet! The extra circumference required for the outer rail = $2(3.1416)(56.5'') = 355$ inches, or 29.583 feet. Thus the track requires only 50,000 miles 29.583 feet of rail.

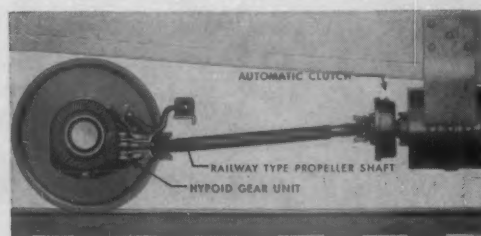
B. 10.948 hours. Of course we're running the train in the opposite direction to which the earth is revolving. Then, if x = the number of hours required, we have $x(25,000) +$

$$x(100) = 12,500 \text{ (where } \frac{25,000}{24} = \text{hourly speed of earth).}$$

Upon reducing, x is shown to be 10.948 hours.

Famous Solutions TO RAILROADING PROBLEMS

The steady and growing adoption of the Spicer Generator Drive . . . now totalling over 10,000 installations on over 70 American railroads . . . indicates proof of



Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs.

The Spicer Railway Generator Drive is manufactured, sold and serviced by

DANA CORPORATION
TOLEDO 1, OHIO

superior efficiency in delivering electrical energy for railway car use.

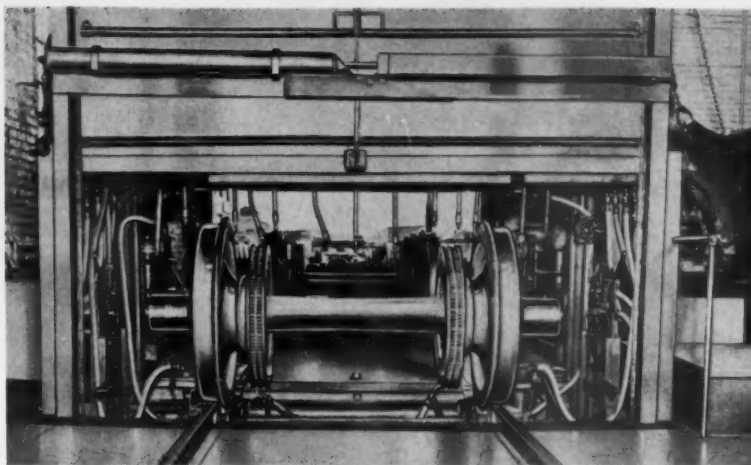
The Spicer Railway Generator Drive consists of a very simple application of long-lived hypoid gear and pinion mounted on the standard axle. The drive from the gears is positive and constant through Spicer Universal Joints and Propeller Shaft to the Spicer Automatic Clutch mounted between the generator and propeller shaft. This automatic clutch completely absorbs all shocks and disconnects the drive line in case of excessive overload, and also completely disconnects the generator at speeds below 8 miles per hour eliminating shock loads when cars are being shunted.

Write for illustrated literature.



ENGINEERING
DANA
MANUFACTURING

NEW DEVICES

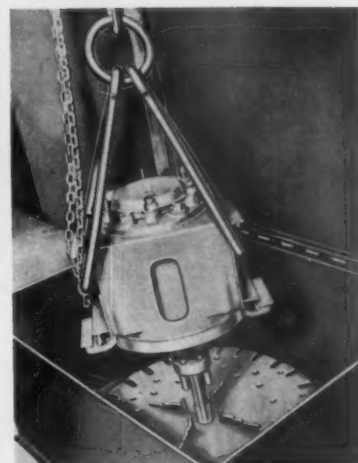


Washing Machine for Wheels and Bearings

A wheel and bearing washing machine, which meets the increasing need to clean car and diesel wheels for inspection, handles plain or roller-bearing car or diesel wheel sets. One man can do the entire cleaning operation. Plain bearing wheels take about 10 min., rolled bearing wheels and boxes, 15 min., and diesel drivers, 20

min., using an average of 31 cents worth of cleaning solution.

The unit consists of a heated solution (180-200-deg.) tank, a pump, one large and two small cabinets, rotating mechanisms and a system of spray nozzles. Wheels are cleaned by 28 nozzles in the large center cabinet. Roller bearing boxes are cleaned



in small cabinets on either side by spraying the solution both inside and outside of the bearing boxes while they are rotated. The inside spray pipes rotate in the same manner as a rotating lawn sprinkler.

The cleaning solution is delivered to the three cabinets by a 450-gpm pump driven by a 15-hp motor. The wheels are rotated while being cleaned by a 3-hp motor.

Paxton-Mitchell Company, 2614 Martha street, Omaha.



Portable Box-Car Cleaning Unit

A portable vapor hydro-steam cleaning unit, Model 4989-G, can eject 1,200 gal per hour of hot water at 240 psi, or enough to clean out the dirtiest freight cars quickly and thoroughly. A Vapor-Clarkson 40-hp steam generator in the unit develops 120 lb working steam pressure in 2 min. from cold water and over 1,100 lb of steam per hour which is directed through a Sellers injector where the steam heats the water and the pressure is increased by a venturi

in the injector.

The unit is mounted on a two-wheel trailer enclosed in a trim metal cabinet with large doors so the operator can easily reach all controls. Fuel tanks for eight hours of operation and a float control water supply tank are incorporated in the cabinet. High pressure steam hoses and a cleaning gun are included with the unit.

Automatic controls on the steam generator cause the machine to make steam only

when the cleaning gun is turned on; however, the steam generator automatically cycles on and off to hold the working steam pressure.

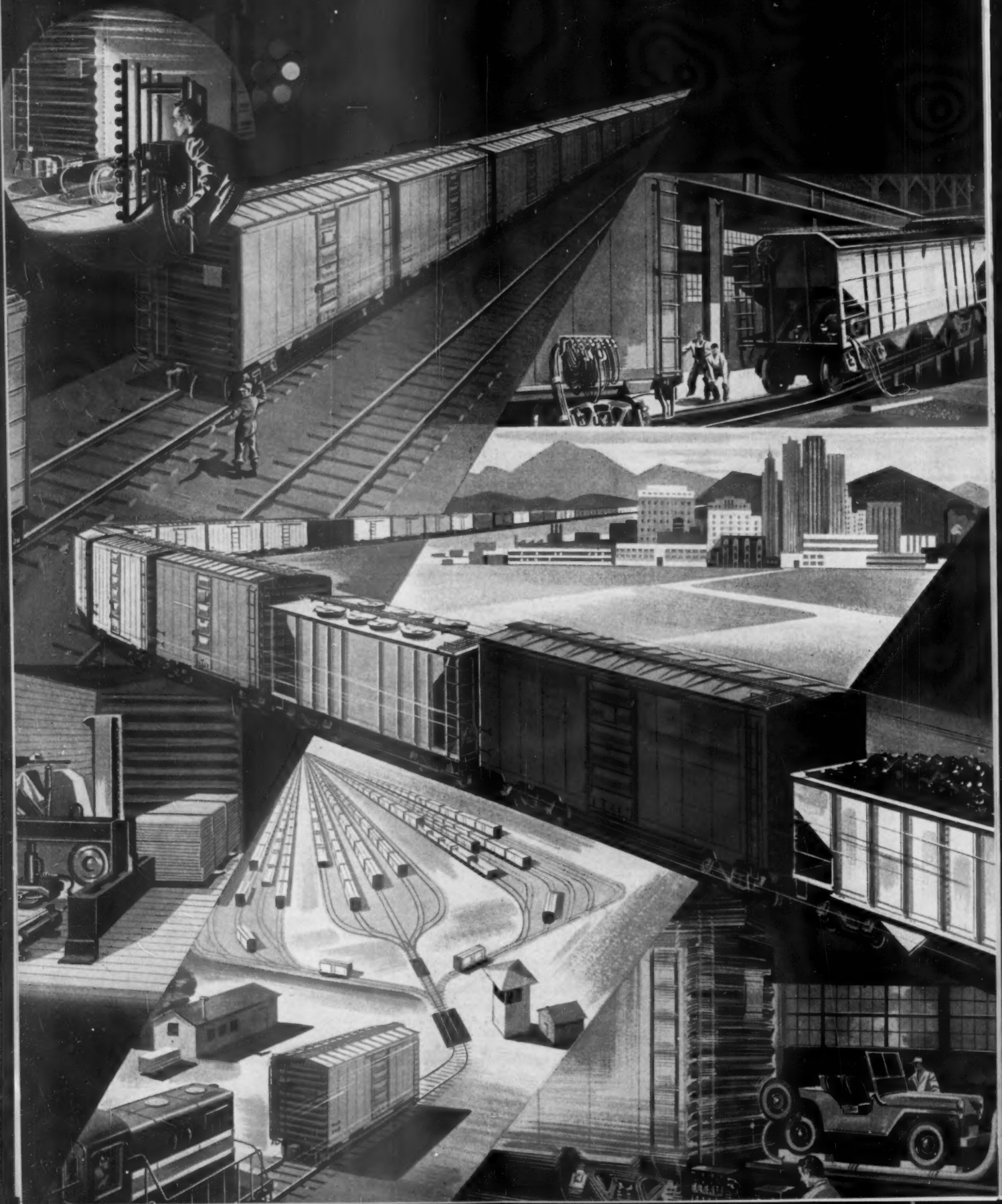
A 4½-hp gasoline engine drives the feed water pump, blower, fuel pump and magneto for constant ignition, or a 2-hp electric motor may be used. Hot gases from the forced-draft fuel-oil fire in the steam generator wipe over the patented steel coils and efficiently turn the water pumped through the coils into steam. Steam pressures can be changed from 75 to 290 lb pressure by adjusting one control. The steam generator consumes fuel oil at the rate of 9 gal per hr of fuel-oil when running continuously.

This hydro-steam cleaning unit is equipped to do effective cleaning in three ways: by jetting out 180-deg water under 240 lb pressure; by jetting hot water under pressure mixed with a cleaning detergent; and steam cleaning with or without detergents. One of these methods will generally remove the most obstinate dirt and clean railroad box and refrigerator cars between shipments sufficiently to permit upgrading the cars for higher commodity loading and thus increase railroad freight revenue.

Vapor Heating Corporation, 80 East Jackson Boulevard, Chicago 4.

(New Devices continued on page 90)

Stamina and economy are born



in a laboratory reproduction *of the*



GREAT AMERICAN RAILWAY *System*

You could, simply by standing in Pullman-Standard's Research and Development Laboratory, give a blow by blow account of the daily life of a freight car operating anywhere on the Great American Railway System.* For here are reproduced the forces created by switching and humping, the vibrations caused by oscillating and shaking and the stresses traceable to heavy loads and shifting ladings.

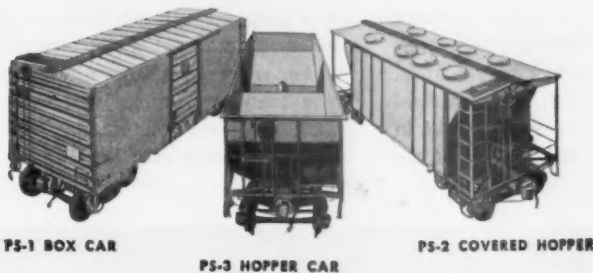
These and other destructive effects of normal operation are measured by scores of scientific devices such as strain gauges, ocllographs and high speed movie cameras. It is only by means of such data that the clues to design problems can be

found, that the cost and weight penalties of construction which exceeds a reasonable safety factor can be avoided.

The stamina and life-time economy of the PS-1 Box Car were created in the laboratory. And the "on line" inspection of representative numbers of the 57,000 now in use, verifies it. The PS-2 Covered Hopper and the PS-3 Hopper Car also have designed- and built-in stamina balanced with economy, as a result of this laboratory reproduction of operating conditions. All three are quality cars built to earn more ton miles of revenue at lower cost per year of service, wherever they are sent.

*A typical box car moves, in one year, on 39 different roads, including two or more trips on 24 roads. (A. A. R. data)

Built to serve best on the **GREAT AMERICAN RAILWAY SYSTEM**



PS-1 BOX CAR

PS-3 HOPPER CAR

PS-2 COVERED HOPPER

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

75 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

How Well Does Your Present Source Compare With National's COMPLETE Facilities For Motor and Generator Repair

Most motor repair shops can perform some of the operations listed below. Very few can handle them all. These are not routine operations, but extras which require expensive specialized equipment and experience. National service includes all 17 operations. How does your present repair source compare?

plus value operation	available at National	at your present repair source
1. redesigning and modernizing by competent engineers	<i>yes</i>	_____
2. vapor degreasing to insure good bonding of varnish	<i>yes</i>	_____
3. corncob blasting to prepare surfaces like new	<i>yes</i>	_____
4. rebuilding and remachining to standard of mechanical fits	<i>yes</i>	_____
5. temporary hotbanding to seat coils in slots	<i>yes</i>	_____
6. hot rerolling of permanent bands	<i>yes</i>	_____
7. grinding and polishing of journal shafts	<i>yes</i>	_____
8. vacuum impregnating	<i>yes</i>	_____
9. dynamic balancing	<i>yes</i>	_____
10. grinding and polishing of commutator at top operating speed	<i>yes</i>	_____
11. load testing	<i>yes</i>	_____
12. high frequency testing	<i>yes</i>	_____
13. electronic bar-to-bar and high sensitivity ductor testing	<i>yes</i>	_____
14. surge comparison testing	<i>yes</i>	_____
15. high potential ground testing	<i>yes</i>	_____
16. magniflux testing	<i>yes</i>	_____
17. anti-friction bearing inspection	<i>yes</i>	_____
Total	<i>17</i>	_____

If you can't answer "yes" for your present source on all 17 operations, you're taking unnecessary chances on getting less than the best repair work. You can't tell in advance on which jobs National equipment and National know-how will pay off in improved performance or longer life. So play it the

one safe way — make National your first source for *all* motor and generator repairs.

For more details on why the motor or generator you send to National will often come back better than new, call your nearby National field engineer today. Or drop us a line for his name and address.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.



ELECTRICAL ENGINEERS; MAKERS OF ELECTRICAL COILS AND INSULATION
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

Safe Lifts



You can be sure that your heaviest lifts can be safely handled if your slings are Yellow Strand Braided Safety Slings.

Back of this safety are the quality steels that go into all Yellow Strand ropes—the patented braiding methods that keep working safety factors high—the specially designed fittings that are tailor-made for the lifts you want to make.

Ease of handling is important, too. Yellow Strand Braided Safety Slings have the flexibility that allows fast installation, yet maintains non-slip contact on wrap-around or other hard-to-hold lifts.

So when you want to be sure of safe lifts—when you want an easy-to-handle sling that will speed up your work—specify Yellow Strand Braided Safety Slings. Write today to Broderick & Bascom Rope Co. for profitable facts on braided safety slings for all your lifting problems.

BRODERICK & BASCOM ROPE CO.
4203 Union Blvd. St. Louis 15, Mo.

FOR SAVINGS...SAFETY...SPEEDI-SERVICE



**It began as an experiment—but paid off
for everyone concerned. That's why**

"Trailer" traffic increases 3200%

Anyone who doubts the future of trailers on flatcars should take a long look at the New Haven's Trailiner service. Starting in 1938—when 1,506 trailers were shipped—it has mushroomed to the point where seven separate Trailiner trains carried 50,255 trailers between New York, Boston, Providence, Springfield and New Haven during 1953.

Dependable schedules are maintained by a fleet of 360 specially designed and constructed flatcars—all mounted on ASF Ride-Control Trucks. Result? Trailer and lading get a safe, smooth ride at almost passenger-train speeds. Using Ride-Control Trucks, experience has shown that if a trailer load rides safely to the New Haven yards, it rides safely on the flatcars.

And everybody benefits. The New Haven builds additional revenue. The truckers enjoy relief from highway hazards... they get balanced distribution of empties at lowest possible costs... and

they've doubled the number of trailers used per tractor.

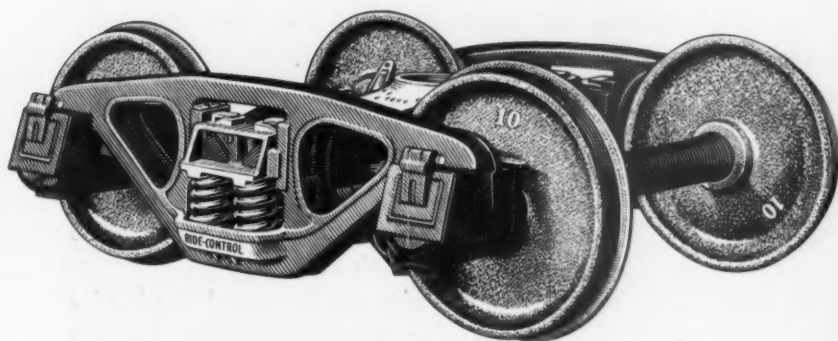
Today, Trailiner service is no longer an innovation. It's an outstanding example of progress... with two great transportation methods working together.



Trailiner flatcars receive greater utilization than practically any other freight cars in revenue service. The fleet of Trailiner cars will soon be enlarged with delivery of 100 new cars now on order. These new cars will also run on ASF Ride-Control Trucks—modified for use with roller bearings.



on the New Haven's "Iron Highway"



The "Trailer" rides on

ASF

ride-control®
trucks



AMERICAN STEEL FOUNDRIES

410 N. Michigan Avenue, Chicago 11, Illinois

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

Dayton **ENDLESS V-Belts** solve power-interruption problem

1" BC-6 Endless V-Belt Axle Drive answers need of major railroad for constant, positive power

Here's how one railroad, working with Dayton Field Engineers, obtained more dependable power for air conditioning units and reduced belt drive maintenance and replacement costs at the same time.

THE PROBLEM —

A program to improve air conditioned passenger comfort was threatened by excessive belt breakage on under-car generator drives. The power demands placed on the belts using flat pulleys exceeded their maximum capacity. As a result, frequent service interruptions occurred, battery reserves were dissipated and increased yard recharging was necessary.

Exhaustive tests were made of several types of drives, but none proved entirely successful or economical. Dayton Field Engineers were then called in to discuss the problem.

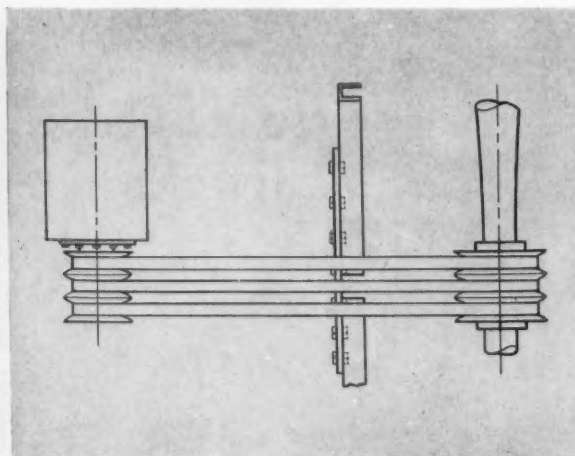


Completely Safe! Dayton's recommended procedure for cutting and splicing end-sill to accept Endless V-Belts has the written approval of the foremost builder of railway trucks.

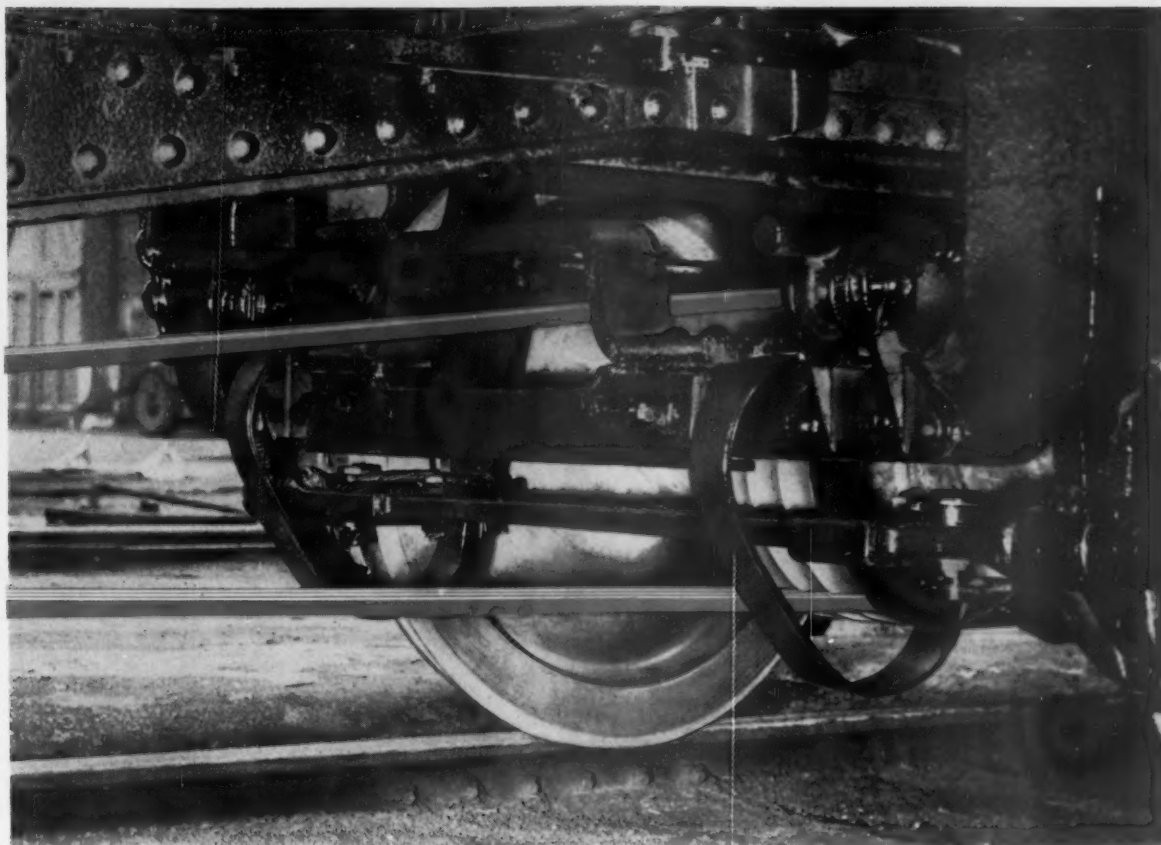
THE SOLUTION —

Dayton Field Engineers recommended replacement of all old style belt drives with 1" BC-6 Dayton Endless V-Belt drives.

Power supply improved at once! The harder gripping, longer lasting Dayton Endless V-Belts developed power to satisfy the heaviest demands of air conditioning units. Power interruptions were eliminated. Maintenance and replacement costs were drastically reduced. The rugged Dayton Endless V-Belts outlasted old style belts by 4 and 5 to 1 setting new records for dependable performance.



Schematic diagram shows how end-sill is cut to accept Dayton Endless V-Belts. Note the minimum cut required and the manner in which the splice is made to reinforce the sill.



Dayton Endless V-Belts are easily replaced in axle drives. They outlast two and three wheel turnings. Changes can be made when trucks are down for normal wheel repair.

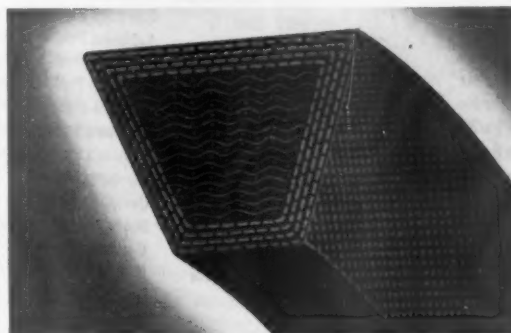
And, for added service protection, Dayton 1" Connector V-Belts can be used on interim replacement of Endless belts where damage has resulted from extraneous causes.

200,000 Miles of TROUBLE-FREE Performance

Dayton 1" BC-6 Endless V-Belts rolled up 200,000 miles of under-car service in the months that followed. So successful have they been that one large railroad has specified their installation on 63 new cars to be added to the line.

This is a typical example of how Dayton Field Engineers and Dayton Research lend a hand to the railway industry in the solution of its problems.

A call will place a Dayton Field Engineer at your service. Or write direct to: Dayton Rubber Co., Railway Division, Dept. 206, Dayton 1, Ohio.



Dayton Endless V-Belts are readily convertible to use with belt connectors for emergency applications.

Railway V-Belts by

Dayton Rubber

Since 1905

World's Largest Manufacturer of V-Belts

DAYTON RUBBER CO., RAILWAY DIVISION, DAYTON 1, OHIO

180,000 freight cars have been built

1952-53 freight car orders using USS COR-TEN steel

DOMESTIC	NO.	TYPE	BUILDER
Atchison, Topeka & Santa Fe	500	Gondola	Pressed Steel Car Co.
Chesapeake & Ohio	1000	Hopper	American Car & Foundry Co.
Chesapeake & Ohio	300	Gondola	American Car & Foundry Co.
Chesapeake & Ohio	1900	Hopper*	Company Shops
Chesapeake & Ohio	450	Gondola*	Company Shops
Chesapeake & Ohio	500	Hopper	American Car & Foundry Co.
Delaware, Lackawanna & Western			General American Trans. Corp.
Denver & Rio Grande Western	1700	Gondola	General American Trans. Corp.
General American Transportation	600	Refrigerator	General American Trans. Corp.
General American Transportation	110	Cov. Hopper	General American Trans. Corp.
General American Transportation	1000	Refrigerator	General American Trans. Corp.
Great Northern	500	Box	Company Shops
Illinois Terminal	100	Hopper	Pressed Steel Car Co.
Norfolk & Western	300	Hopper	Company Shops
Norfolk & Western	300	Hopper	Company Shops
Norfolk & Western	1000	Gondola	Company Shops
Norfolk & Western	345	Hopper*	Company Shops
Orinoco Mining Company	560	Ore	Magor Car Corporation
St. Louis Refrigerator Car Co.	300	Refrigerator	Pressed Steel Car Co.
St. Louis, San Francisco	300	Gondola	Pullman-Standard Car Mfg. Co.
St. Louis, San Francisco	300	Hopper	Pullman-Standard Car Mfg. Co.
Seaboard Air Line	400	Cov. Hopper	American Car & Foundry Co.
Southern Pacific	1500	Box	Southern Pacific Equipment Co.
Southern Pacific	1000	Box	Southern Pacific Equipment Co.
Southern Pacific	1400	Box	Southern Pacific Equipment Co.
Southern Pacific	350	Gondola	Southern Pacific Equipment Co.
Southern Pacific	1600	Box	Pullman-Standard Car Mfg. Co.
Southern Pacific	1000	Auto Box	Southern Pacific Equipment Co.
Southern Pacific	250	Box	Southern Pacific Equipment Co.
Southern Pacific	500	Auto Box	Company Shops
Union Pacific	500	Box	Company Shops
Union Pacific	12	Air Dump	Baldwin-Lima-Hamilton
U.S. Steel, Fairless Works	314	Hopper	Company Shops
Virginian	300	Gondola	General American Trans. Corp.
Western Pacific			
FOREIGN			
Canadian National	1400	Box	National Steel Car Co.
Canadian National	200	Cov. Hopper	Marine Industries, Ltd.
Canadian National	100	Cov. Hopper	National Steel Car Co.
Canadian Pacific	150	Refrigerator	National Steel Car Co.
Canadian Pacific	500	Gondola	Eastern Car Co.
Canadian Pacific	398	Gondola	Magor Car Corporation
Mozambique Railways (Portuguese East Africa)			
Sydney & Louisburg	200	Hopper*	Eastern Car Co.
Union Miniere (Belgian Congo)	30	Air Dump	Baldwin-Lima-Hamilton
Union Miniere	24	Air Dump	Baldwin-Lima-Hamilton

* Rebuilt

1933



1953

TWENTY YEARS OF PERFORMANCE

USS HIGH STRENGTH STEEL

better with USS COR-TEN steel since 1933

IN THE LAST TWO YEARS, ORDERS HAVE BEEN PLACED FOR

22,000 freight cars

built with USS COR-TEN steel

● Look at this long list of recent orders for freight cars built with USS COR-TEN steel. Twenty-two railroads and other car users are represented here. Only four of them are using COR-TEN steel construction for the first time. The rest have had years of experience with equipment made of COR-TEN steel.

For example, the Chesapeake & Ohio, Seaboard Air Line and Union Pacific have been cutting operating and upkeep costs with COR-TEN steel cars for as long as 20 years. Among the first to put this superior steel to work, these three railroads have from time to time, since 1934, added to their original COR-TEN steel equipment and among them have now in service a total of over 32,000 cars of COR-TEN steel construction.

Their experience is typical. In other words, most of the orders now being placed for COR-TEN steel cars are *repeat* orders.

We emphasize this because it highlights the important fact that COR-TEN steel construction is bought again and again. And for good reason. Many years of superior service performance have proved that the high strength and high corrosion resistance of COR-TEN steel pay off in substantially reduced maintenance costs.

Today, many of the major railroads in America have considerable numbers of USS COR-TEN steel cars on their lines. In fact, more than 180,000 of these money-saving cars are now in service.

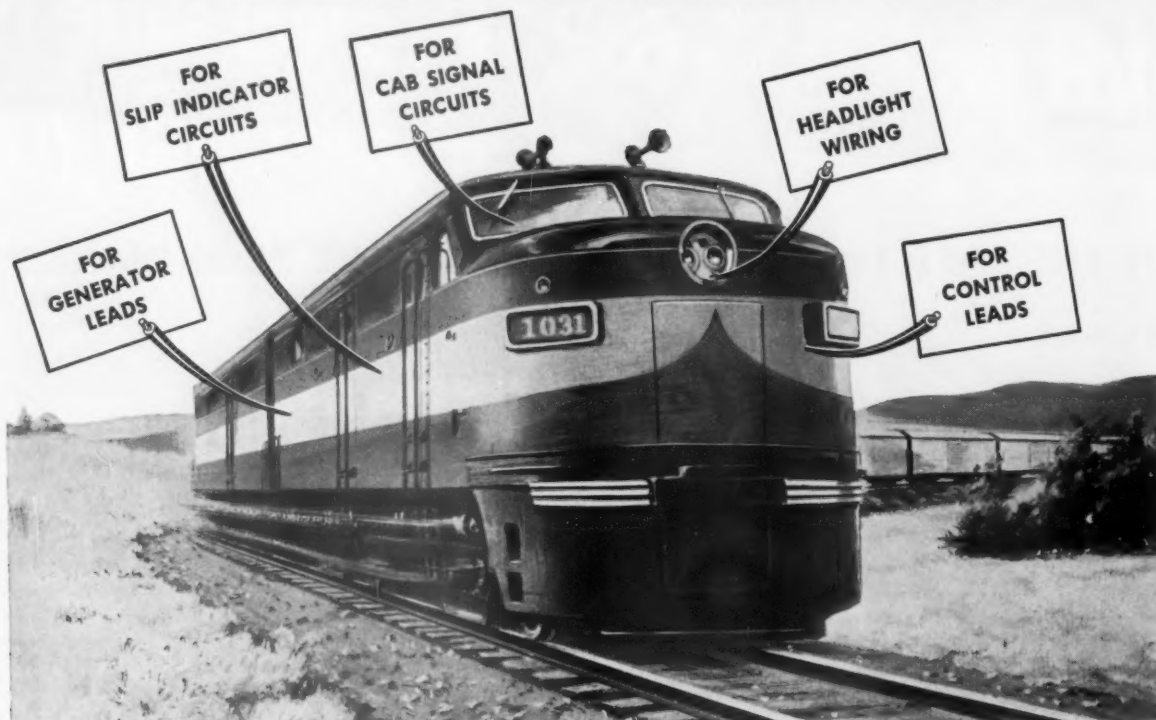
So satisfactory has been the performance of this equipment that not only here, but in Canada, in South and Central America and even in Africa, among cost-conscious railroad men, COR-TEN steel construction has come to mean "The best in freight car equipment."

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

4-698

UNITED STATES STEEL

SIMPLIFY DIESEL-ELECTRIC LOCOMOTIVE REWIRING



Now the many cable types can be replaced with ONE type . . . G-E VERSATOL GEOPRENE



When you plan your diesel-electric rewiring program, you can reduce stocking problems if you bear this fact in mind: Now one type of G-E diesel-electric locomotive cable can be used, size for size, to replace the worn-out general purpose wiring in any diesel-electric locomotive.

G-E Versatol* Geoprene Cable is available in sizes No. 14 Awg and larger for power circuits (1000-volt rating), and in sizes No. 16 and 14 Awg for control circuits (300-volt rating). Control cable rating is printed on the surface for easy identification.

TOUGH — for power circuits

G-E Versatol Geoprene Cable stands up under the severest operating conditions. The neoprene-base jacket resists flying dust, grit and sand. It withstands oil, water, cleaning compounds, live steam and ice. The extra-

flexible rope stranding is designed to withstand continual flexing.

FLEXIBLE — for control circuits

Fine stranding makes this cable extremely easy to handle and pull through conduit. Insulation strips cleanly for easy application of terminals.

Carry only one type in stock

All general purpose diesel-electric locomotive rewiring can be done with G-E Versatol Geoprene. Special high-temperature G-E cables are available for use in high-heat areas. Write for specification booklet "G-E Diesel-electric Locomotive Cables." Section W146-947, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

Progress Is Our Most Important Product

GENERAL  ELECTRIC

SCRATCHES THAT COST AND COST AND **COST**



In Diesel Oil Filtration, too . . . An Ounce of Prevention Can Preserve the Life of an Engine



Selection of "Prescription" Filtrants: Cotton Threads, Blended Cotton Threads, Felted Paper.

Uniform volume, density packed in one-piece Sock. Integral End-Seal or Grip-Seal Cartridge construction.

Spring-reinforced center tube, slotted for greater, more even flow rates.

Tin-plated metal parts. Bale-type handles for easy installation and servicing.

Almost too small to be seen, but large enough to destroy the efficiency of railroad Diesel engines, tiny scratches and abrasions on engine parts are caused by the grit and dirt picked up by fuel and lube oils in railroad service. This grit, plus the sludges and gums that foul engine parts, cost railroads many dollars in down time, replacement parts, repair and maintenance expense.

That's why WIX Engineered Filtration is so important to you. For WIX "Prescription" Filtrants are engineered, Laboratory tested and field proved for individual engine characteristics as well as variables in operating and climatic

conditions—provide peak filtering efficiency in every type of service. WIX Engineered Cartridge construction assures precision fit, longer Cartridge life and ease of maintenance.

WIX has unmatched research and production facilities that are responsible for this great Line of Filter Cartridges for railroad service. From this combination of laboratories, plants and equipment has come many of the advances in modern filtration that stretch out oil mileage and preserve the life of engines. Ask us to show you what this specialization in railroad Diesel Filtration can do for you.

ENGINEERED *wix* FILTRATION

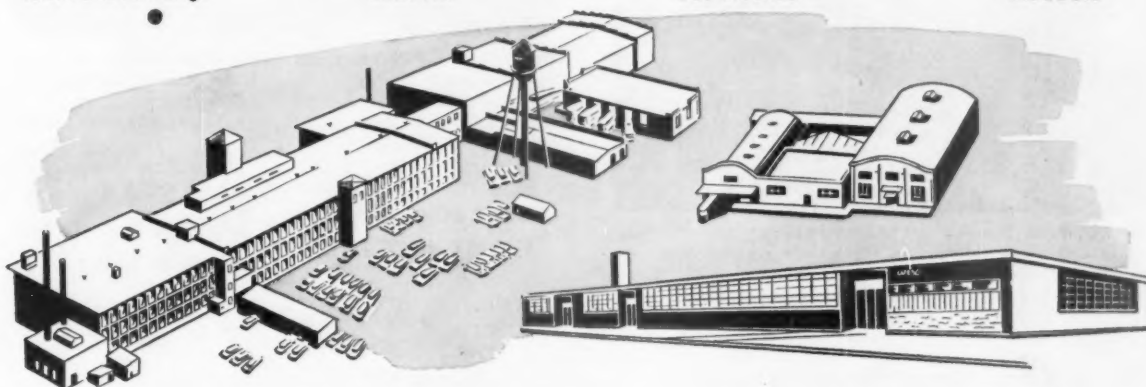
WIX CORPORATION GASTONIA • N • C

WAREHOUSES

GASTONIA
ATLANTA

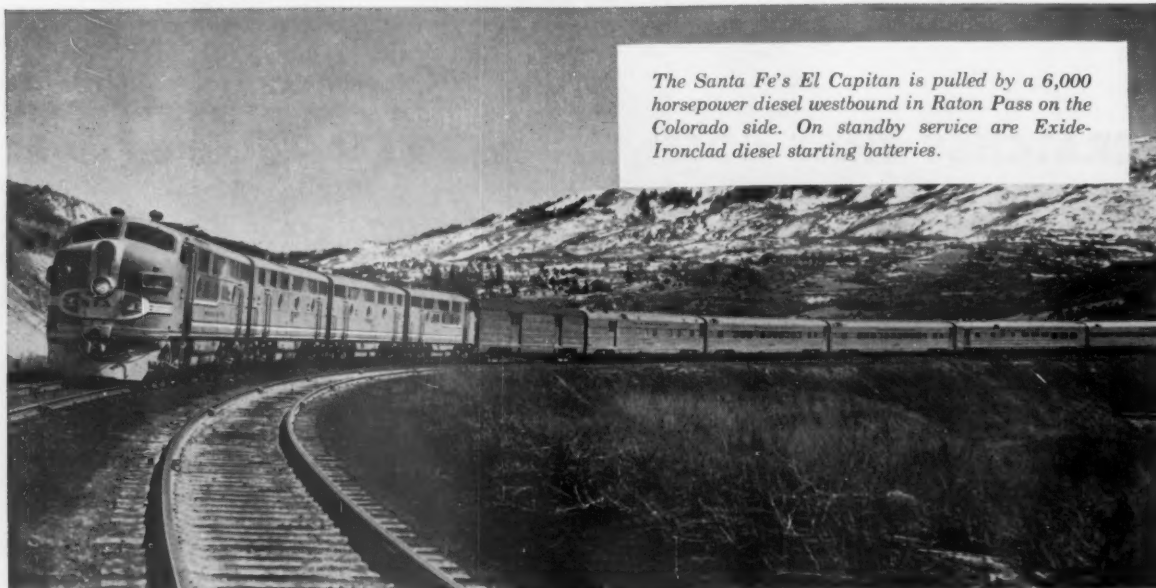
NEW YORK
DES MOINES

SACRAMENTO
ST. LOUIS



GET POSITIVE OPERATION OF CONTROLS

...with dependable Exide-Ironclad batteries!



The Santa Fe's El Capitan is pulled by a 6,000 horsepower diesel westbound in Raton Pass on the Colorado side. On standby service are Exide-Ironclad diesel starting batteries.

BESIDES STARTING a big diesel, Exide-Ironclad batteries supply power for control circuits, lighting and other auxiliary loads. This diesel starting battery has ample reserve of power at high sustained voltage to guarantee positive operation of control equipment under any and all operating con-

ditions. With Exide-Ironclads uninterrupted "on line" service, high availability of equipment, is assured. Also, lower costs for operation, maintenance and depreciation make Exide-Ironclad diesel batteries your best power buy—**AT ANY PRICE!**



THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing greater power. Also, more active material is retained, giving longer working life.



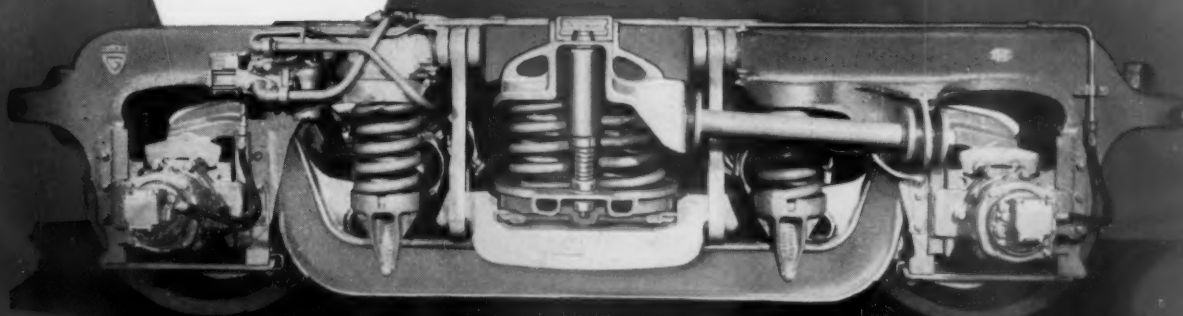
DEPENDABLE POWER, ample reserve power for any diesel need, comes from improved Exide-Ironclads. Prompt delivery. For full details, call your Exide sales engineer—write for Form 4843 (Installation and Maintenance of Diesel Starting Batteries).

Your best power buy
... AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

*It's a
Fact!*



Commonwealth
OUTSIDE SWING HANGER TYPE TRUCKS
with CENTRAL BEARINGS

Introduce a New Era in Riding Comfort

Commonwealth Outside Swing Hanger Type Trucks with Central Bearings are now being used on practically all main-line passenger cars being built in North America, and as replacements on many existing cars. It's facts like this that prove the general acceptance of these trucks of latest design to assure the utmost in riding comfort. With broad spring base, all-coil springs, bolster anchors, and shock absorbers, this design of truck substantially reduces car body roll and greatly simplifies inspection and maintenance of truck parts.

For smoother, more comfortable riding at all speeds and efficient, dependable operation, equip your existing passenger train cars with Commonwealth *Outside Swing Hanger Trucks* arranged with the new *Central Bearings*.

GENERAL STEEL CASTINGS

GRANITE CITY, ILL. • EDDYSTONE, PA.



✓ SHIP BY RAIL

✓ TRAVEL BY RAIL



This test guards against rim fractures in DIESEL WHEELS

Let reflectoscope testing guard you against internal rim fractures in your diesel wheels. These can occur because of the high and complex stresses involved in diesel service. Armco investigations have shown that internal rim fractures in diesel locomotive wheels originate at hidden inclusions or other discontinuities, located under the center of the tread.

Armco spots these discontinuities by reflectoscope testing of the entire wheel rim. Wheels that do not meet the standards of acceptance are rejected.

The reflectoscope test is the first non-destructive test ever employed on wheels to check internal quality. It's done with a searching crystal and ultra-sonic waves. The electronic device literally puts its ear to the wheel rim and through ultra-sonic inspection finds any discontinuities that could lead to rim failure.

Specify Armco reflectoscope-tested wheels for *your* diesels. This extra precaution costs very little.

For the complete story just write us at the address below or call the nearest Armco district office.

**ARMCO
STEEL CORPORATION**

4614 CURTIS STREET, MIDDLETOWN, OHIO



SHEFFIELD STEEL • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

Reduce lading damage and car maintenance with

NATIONAL

MULTI-PAD RUBBER DRAFT GEARS



SEVERE SHOCKS, that result in costly lading damage and car maintenance, can be substantially reduced by using National Multi-Pad Rubber Draft Gears in place of friction gears.

That's because National Multi-Pad Rubber Draft Gears have greater cushioning capacity.

Tests show 57,000 foot-pounds average capacity at the 4-inch travel mark for the AAR Certified National MF-275 compared to 22,066 foot-pounds average capacity for friction gears (AAR Friction Gear Approval Tests).

For more and satisfied shippers use National Multi-Pad Rubber Draft Gears!



National MF-275 fits all cars with standard sill construction and AAR standard yokes (as shown); MF-275-1 for use with F coupler and yoke. National Multi-Pads eliminate slack in yoke and pocket.

A-902

Technical Center
Cleveland



"Progress through Research"

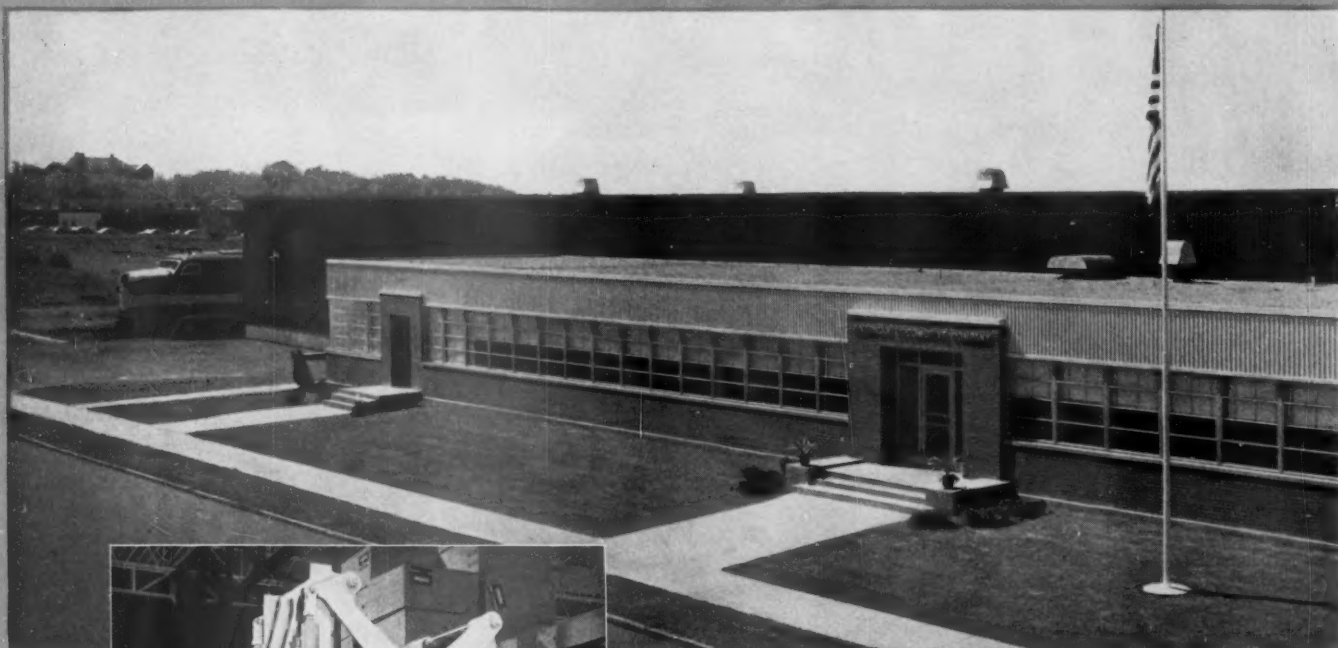
NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • SNUBBER PACKAGES • JOURNAL BOXES and LIDS

NEW ALCO RENEWAL PARTS

Carries over 5,000 Parts,



ST. LOUIS WAREHOUSE USES MODERN MATERIALS-HANDLING equipment such as new "reach" type fork-lift truck, which makes possible more efficient utilization of aisle space.



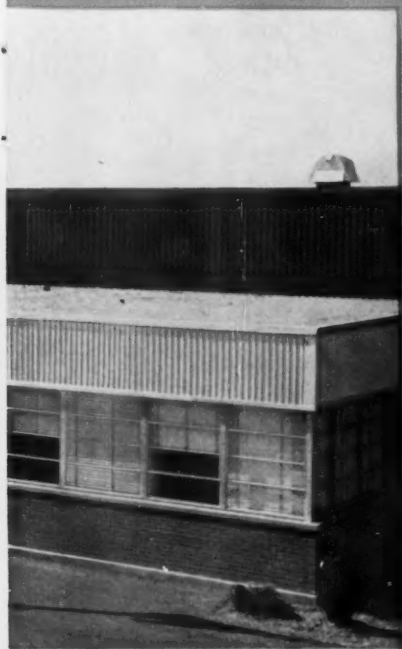
PART OF THE HUGE FLOOR SPACE. Greater storage capacity for Alco Renewal Parts is made possible with floor space measuring 120 by 240 feet and a 15-foot ceiling clearance.

ALCO

AMERICAN

WAREHOUSE IN ST. LOUIS

occupies 30,000 square feet



The new Alco Renewal Parts warehouse in St. Louis is evidence of a flexible supply system that maintains the highest standards of customer service. Using modern materials-handling devices, it will serve over 50 South Central Railroads with a stock of over 5000 different parts. This inventory enables Alco to maintain excellent service levels, thereby *reducing your railroad's investment in spare parts.*

All normal locomotive parts—both mechanical and electrical, as well as many nonwearing parts, such as cylinder blocks, connecting rods and couplers—will be carried in the new warehouse. Customers can be sure that almost any replacement part requirement will be filled quickly.

You are invited to visit the new Alco warehouse, inspect our facilities and see for yourself how we are prepared to give you superior service on genuine Alco renewal parts.



SMALLER PARTS STORED FOR QUICK DELIVERY. Regional management has complete responsibility for inventory and strives to anticipate your needs.

Four Reasons Why it Pays to

Specify Genuine Alco Renewal Parts

1. **Latest Design Features.** All genuine Alco parts incorporate features and improvements developed through Alco's extensive laboratory and field research.
2. **Full Warranty and Superior Quality Control.** All new or repaired parts from Alco warehouses carry a full warranty. Quality control ranges from microscopic analysis of metals to mechanical testing of giant forgings.
3. **Scientific, Uniform Packaging.** Alco parts are packaged to protect them from dirt, moisture and rough handling—as well as to provide convenience of storage.
4. **Multiple Supply—Single Responsibility.** Advantages include fast delivery, low shipping and handling costs, single purchasing contact.

THERE ARE NO SUBSTITUTES FOR GENUINE ALCO RENEWAL PARTS

LOCOMOTIVE COMPANY

Sales and
Service Offices
in Principal
Cities

Freight-Car Specialization

The ideal freight-car situation from the standpoint of the railroad operating officer is a supply of the general-purpose types of cars.

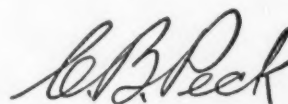
These would start with the box car and go on to include gondolas, hoppers, flat cars, stock cars, general-purpose tank cars and ice-cooled refrigerator cars. The trend of the times, however, is in the direction of a constantly increasing number of car types each more or less specifically tailored to the handling of a single commodity or type of commodity. These include various types of loading devices installed in box cars, a variety of tank cars each built of a material or with a lining which is not damaged by corrosive products and protects sensitive products from contamination and covered hopper cars for handling of bulk dry lading. And now the pressure for mechanical refrigeration is building up.

The major problem created by most special car types is empty mileage. Cars which are limited in the kind of lading they are fitted to handle are less readily available for return loading than cars of the standard types. This is less true of box cars with some of the devices for securing lading than of special cars of other types, but not of all of them—cars equipped for handling automobile engines, for instance.

Notwithstanding the problems which it creates,

each new special car exercised an important favorable influence on the railroad business because it improves the service to the shipper or reduces his overall transportation expense. Indeed, the special types of tank cars have been major factors in creating new industries in the chemical field, from which much new traffic has come to the railroads. All these cars, therefore, have to be accepted as essential to the welfare of the railroad business.

The reluctance with which the railroads and private car lines have been facing the advent of the refrigerator car with mechanical refrigeration equipment is understandable. The problem of servicing power-operated refrigerating plants (of which there will be numerous unstandardized types, at least for some time), unattended while moving over hundreds of miles of line, is not one to be regarded lightly. Nevertheless, the development of automatically controlled refrigeration is essential to the movement on rails of a variety of frozen-food products, the ultimate quality of which depends upon keeping them at temperatures below those which can be maintained with certainty using ice and salt. In this case, mechanical refrigeration is not essential to the growth of the frozen food industry—the traffic can be and is being moved over the highways. It is the railroads who need it if they are to keep the business.





TEXACO AIRTAC

assures maximum air filter efficiency

TEXACO AIRTAC is a special gel-type air filter coating designed to assure maximum collection efficiency from all railroad diesel air filters. It has remarkable stability under application temperatures, high demulsibility, and is non-foaming. You can count on it for—

Smooth, Uniform Coverage: *Texaco Airtac* adheres readily, provides a smooth, uniform coating without dry spots or excess accumulations that might cause webbing on the screens.

High Dust Retention: *Texaco Airtac* traps and retains all dust it contacts. As dust builds up, the *Texaco Airtac* is "wicked" through it—always presenting a fresh oil surface to ensnare further dirt, regardless of air velocity or dust concentration.

No Creeping, No Dripping: *Texaco Airtac* will not creep, drip or melt off screens even at ambient temperatures as high as 185° F. Nor will rain or snow cause loss of coating or impair efficiency.

Texaco Airtac is easy to apply, easy to remove. For full information, call the nearest *Texaco* Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write The Texas Company, *Railway Sales*, 135 East 42nd Street, New York 17, N. Y.



TEXACO Railroad Lubricants
AND SYSTEMATIC ENGINEERING SERVICE

IN ALL
48 STATES

faster, smoother

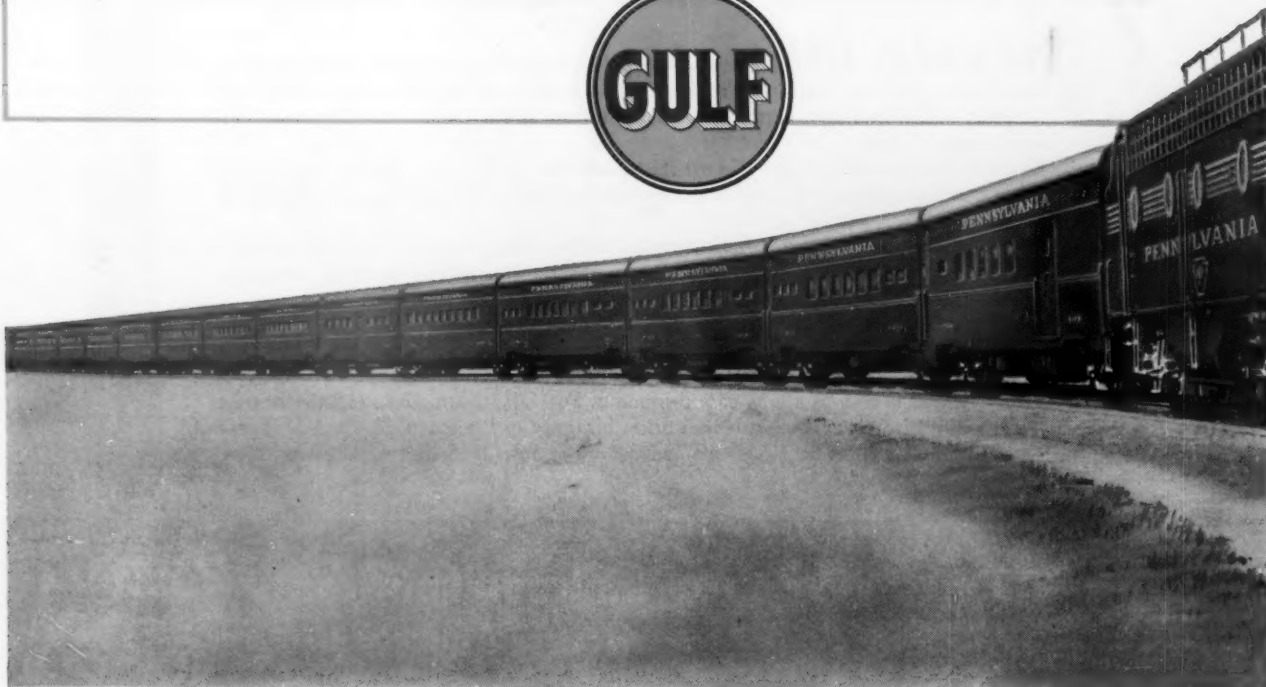
The watchwords of today's American railroads—faster, smoother travel—are typical of the Pennsylvania Railroad's stream-liner, the Spirit of St. Louis, which makes the trip between St. Louis and New York an enjoyable experience for the traveler.

Gulf Dieselmotive Oil contributes to the fine performance of the giant Diesel engines that power the Spirit of St. Louis and many other crack trains. Here's how this top quality Diesel locomotive lubricant helps keep maintenance costs down, availability up:

- 1** Effective detergent action prevents harmful piston ring belt deposits.
- 2** Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.
- 3** 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today, and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company • 1822 Gulf Building, Pittsburgh 30, Pa.



than ever before—

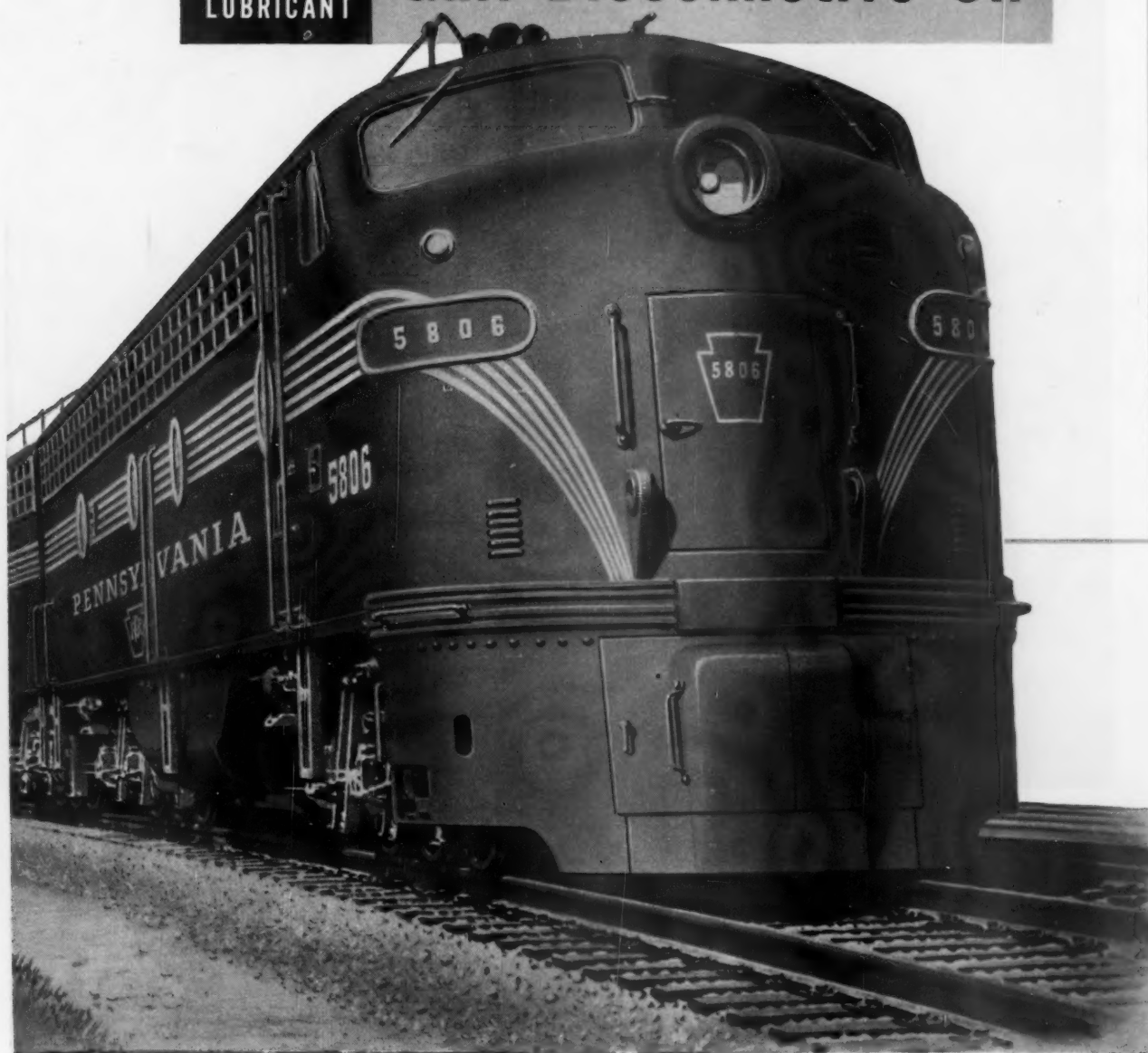
THE
TRAIN

the Pennsylvania's crack

"Spirit of St. Louis"

THE
DIESEL
LUBRICANT

Gulf Dieselmotive Oil



Extra



mileage made here

THIS is a picture of men making USS Wrought Steel Wheels. Only a few of the forging operations are shown here, but all are indispensable to producing Wrought Steel Wheels of superior strength, excellent soundness, and long wearability.

In the extreme background of the picture, a hot wheel blank is being served up to a press for its second forging.

At the left of the picture, a wheel that has just come off the second forging is being swung from a cart into the mammoth punch press that will knock out the center of the wheel hub.

After the punch operation, the charging machine in the foreground will scoop up the wheel, whirl around and thrust it into one of the furnaces at the extreme right. In the photograph, the charging machine is just removing a glowing wheel from the furnace. Heated to the required temperature, it is ready for the rolling mill where it will be rolled to size, measured, and passed on to the coning press—and so on, and so on.

But what does this one-at-a-time wheel making do for you? What advantages will you realize from USS Wrought Steel Wheels? Well . . .

THEY LAST LONGER . . . USS One-Wear Wrought Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.

THEY COST LESS . . . Their far greater life in any given service will reflect a *substantially lower annual cost* than that of the ordinary wheel, even though, initially, the One-Wear Wrought Steel Wheel costs a little more than the ordinary type wheel.

REQUIRE LESS MAINTENANCE . . . Rolling on One-Wear Wrought Steel Wheels, a car spends more time *in service* and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.

SAVE UNSPRUNG WEIGHT . . . Because they are lighter than ordinary wheels, eight Wrought Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which can be directly converted into payload capacity—or result in savings due to the decreased load. Furthermore, reduced unsprung weight means less pounding on the track system.

Two strategically located complete wheel shops are ready to fill your orders for Wrought Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania shop, serving the East and Southeast, and the Gary, Indiana shop, supplying the Western and Southern Lines.

USS WROUGHT STEEL WHEELS

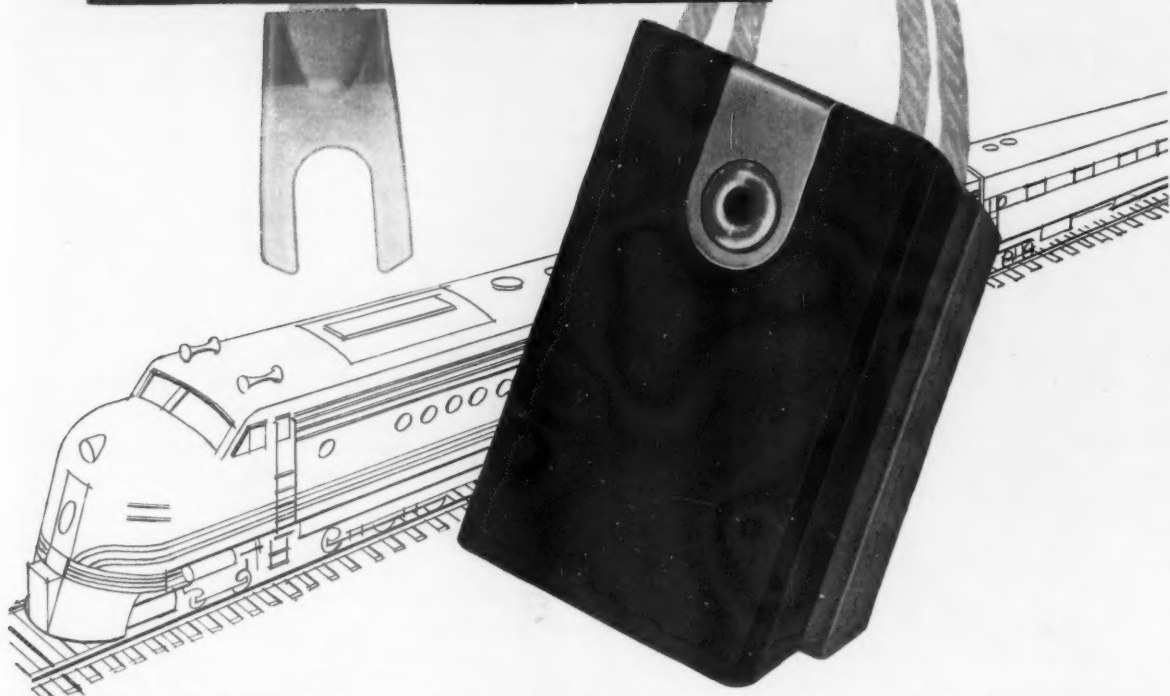
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.



COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

Minimize uneven wear with Speer MULTIFLEX Brushes



There's a Speer Application-Tested Brush for every railroad use:

Traction Motors • Main Generators • Auxiliary Generators • Motor Generators and Dynamos • Traction Motor Blowers • Exciters • Fuel Pump Motors

Speer MULTIFLEX* Brushes operate in single holders—yet they give all the advantages of double brushes.

Besides minimizing uneven wear, they . . .

IMPROVE COMMUTATION • REDUCE VIBRATION • HAVE LONGER LIFE

Reason: their patented two-section construction.

And like *all* Speer Brushes, MULTIFLEX Brushes are 2-way application-tested. First, by hours and hours of laboratory test-runs and, second, by thousands of miles of carefully observed, on-the-job operation.

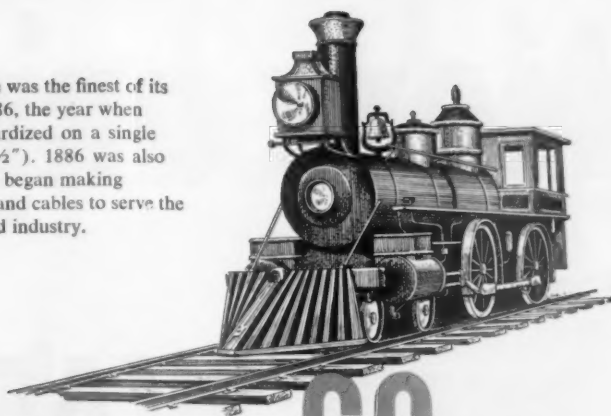
Next time, get application-tested, double-brush advantages—in a single brush. Specify Speer MULTIFLEX.

*Patent No. 2,181,070

SPEER Carbon Co.
St. Marys, Pa.

Divisions: Speer Resistor
Jeffers Electronics
International Graphite & Electrode

This locomotive was the finest of its type back in 1886, the year when railroads standardized on a single gauge (4 ft., 8½"). 1886 was also the year "U. S." began making electrical wires and cables to serve the growing railroad industry.



In step with America's Railroads for **68** years

U. S. Electrical Wires and Cables

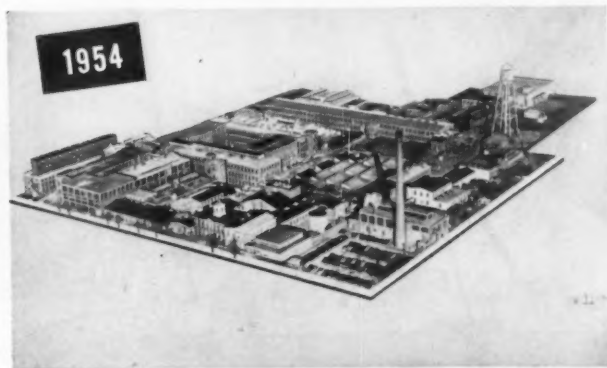
Year by year, America's railroads become more and more dieselized and electrified. That steps up the demand for electrical wires and cables. But it also means that manufacturers have to turn out wires and cables of tougher specifications, greater durability, wider versatility. The tremendously complex centralized traffic control systems and other "push-button" devices need the finest wires and cables obtainable.

United States Rubber Company is right in the middle of this tremendous railroad electrification growth. For 68 years "U. S." has been supplying railroads with the wires and cables required—as well as *anticipating* future demands. "U. S." has gone along side by side with the railroads, as they grow into an ever stronger national transportation system—a system unmatched in economy, efficiency and safety.

"U. S." is the only wire and cable manufacturer growing its own natural rubber, making its own synthetic and plastic compounds. Through this unequaled *control of manufacture*, "U. S." can always guarantee *superior insulation* in every type of wire and cable it produces.



Above is the United States Rubber Company wire and cable factory in 1886. Below (left) as it looks today.

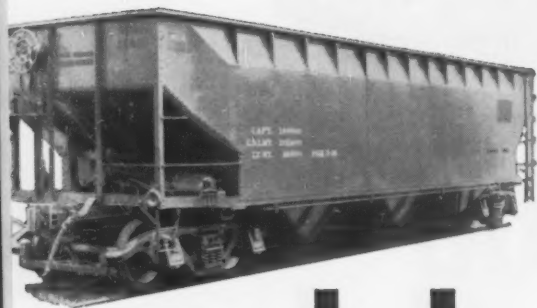


Just as this up-to-the-minute Diesel typifies the advancement in locomotion, so also "U. S." electrical wires and cables typify leadership in their field, as they have for 68 years.



UNITED STATES RUBBER COMPANY
ELECTRICAL WIRE AND CABLE DEPARTMENT • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

New angle cock



WABCOSEAL[®] seals brake pipe nipple

FOR FREIGHT CARS

Wabco compression ring grips pipe when nut is tightened to provide tight seal and strong clamping action.

"O" ring seals the key effectively through a wide degree of key wear. This seal can be obtained on old angle cocks by properly reaming the bushing and inserting new key.

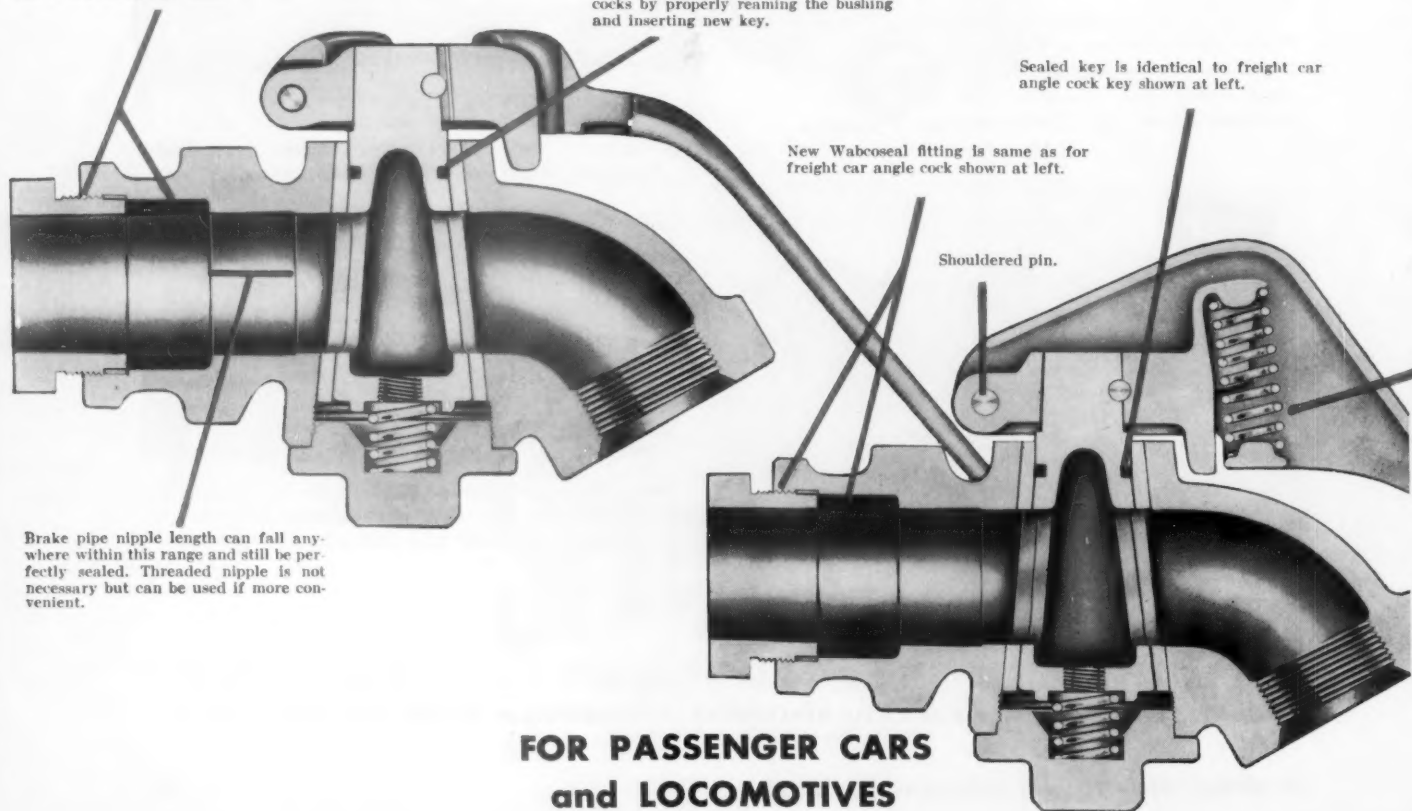
Sealed key is identical to freight car angle cock key shown at left.

New Wabcosal fitting is same as for freight car angle cock shown at left.

Shouldered pin.

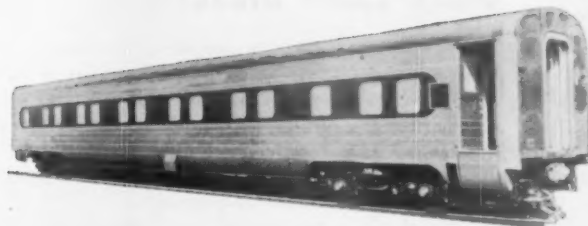
Brake pipe nipple length can fall anywhere within this range and still be perfectly sealed. Threaded nipple is not necessary but can be used if more convenient.

FOR PASSENGER CARS and LOCOMOTIVES

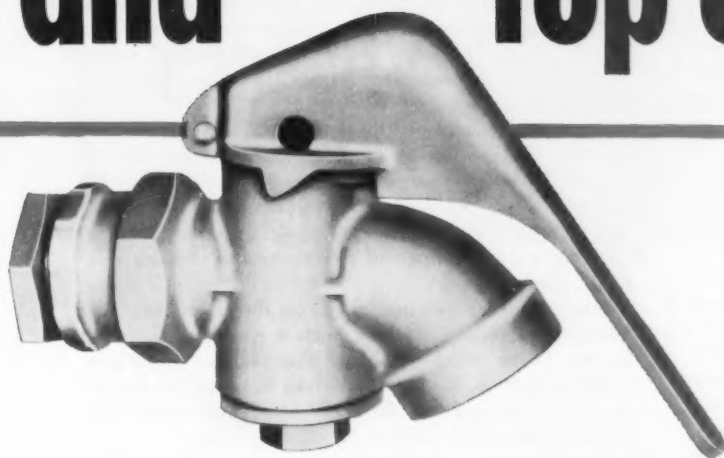


stops air leakage

Angle Cock



and top of key



Strong spring is compressed when handle is raised. Socket is snapped into locking position when handle is fully open or closed. Available for application to angle cocks now in use.

THE new Wabco Angle Cock is made in two styles—one for freight cars and one for passenger cars and locomotives. Both models feature a *sealed* key that stays tight for a wide degree of key wear thus eliminating one of the major causes of air leakage in angle cocks. The sealed key can be installed in your present angle cocks.

The new Wabco Angle Cock has a Wabco compression ring instead of the present tapped fitting that is often a source of leakage. Adequate end tolerance is provided, so you do not have to cut the brake pipe nipple to a precise length.

For passenger cars and locomotives the Wabco Angle Cock has a spring-locking handle that snaps the socket into the locked position when the handle is fully open or closed. A shouldered pin provides proper freedom of handle movement. You can buy this handle separately for the angle cocks you now own.

See your Westinghouse Air Brake representative for more information.



Westinghouse Air Brake COMPANY

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EDITORIALS

Should You Run or Store Extra Diesel Units?

How to handle most economically a temporary surplus of diesel power might at first thought seem to be more in the nature of an academic than a practical problem today. It might further be considered one over which a mechanical officer will have little responsibility if it does come to pass. Unfortunately, however, neither of these notions seem entirely correct.

First of all, a number of roads are already finding themselves in situations where for varying periods of time they have surplus units. More lines will find themselves in a similar state for short periods of time as they approach or reach full dieselization and traffic peaks and valleys occur for seasonal or other reasons. And it may happen sooner than expected as new techniques are learned for getting more service out of each unit.

How much control and responsibility mechanical officers will exercise over what is done with units temporarily in surplus will depend on the road involved. But it is a distinct possibility that many will be called upon to make some cost comparisons between storing and running the extra units. What are the basic factors involved in deciding which will be more economical?

According to a report presented at a recently concluded superintendents' convention, some roads have found that it is better and cheaper to operate the extra units than to store them for short periods of time at least. In other words, they would run four units where three could handle the train, three instead of two, etc. These lines feel that this will not increase the cost of fuel, lube oil or maintenance as these items generally vary in direct proportion to the work performed, or weight of train hauled, rather than to the unit miles run. Therefore—except for overloading or extremely light loading—there is a wide range in which the only increase in the cost of operation and maintenance by using additional units is little or no more than that due to the weight of those units.

The big question that appears to need settling is just how long can a unit be in surplus before it is cheaper to store it than to continue to operate it—one month, three months, six months? How much, if anything, additional does it cost to run one more unit than necessary on a train? On what basis should the cost be computed? Would an answer found on one road be applicable to another road? Or would differences in terrain, traffic characteristics, length of runs, etc., cause the answer to be far different on one road than another?

If it is true that any cost increase of running extra units will be slight, the operating and traffic-gaining potentialities would indicate that the overall interests of the railroad would best be served even though the mechanical department expense ratio might rise by running rather than storing the units. But we should first find

out as accurately as possible just how much more such a policy would cost to see if any increase in maintenance cost can be justified by savings from eliminating storage preparation and by the operating benefits derived.

Locomotive Fuel

The energy to drive railroad locomotives may be derived from coal or oil burned on the locomotive, or it may be taken from an electrical contact system, and there is the possibility that within a ten- or fifteen-year period, it may be obtained from nuclear fission.

At present, the reciprocating steam locomotive is rapidly giving way to the diesel, and in several instances, the diesel has caused railroads to abandon electrified sections. This will evidently not be the case with all electrifications for different reasons which will be discussed later in these pages.

The basic deterrents to new electrifications are the large initial investment required and the fact that an electric locomotive cannot run out from underneath the overhead wire. If there ever are to be new electrifications, it will be because the cost of diesel fuel oil goes on increasing while the price of electric power remains relatively constant.

One railroad is buying lower cost diesel fuel oils, and mixing and clarifying them, with a resultant reduction in cost to the railroad. Should this practice prove generally applicable, it would materially improve the already strong position of the diesel. The use of heavier fuels in the diesel might further increase its tenure.

The oil-burning gas turbine has done rather better than most of its critics thought it would. In its present form, it would seem to be suited to rather limited application, but the demand for more powerful and faster locomotives continues and the gas turbine is constantly being made a more dependable type of motive power.

The coal-burning, steam-turbine-electric locomotive is not being given much credit, primarily because of the failures of its predecessors, but those who have ridden it, and watched it perform seem to have had some of their doubts dispelled.

Those who designed the atomic locomotive are among the most conservative of the nuclear physicists. Their present day calculations indicate that nuclear fission, as a source of public utility energy to compete with coal and water power is a remote possibility. Instead, it is thought that nuclear power is better suited to special applications such as a locomotive. The design publicized was limited in concept because of security reasons, but its designers feel that better designs will be forthcoming.

By and large, the situation is a healthy one. The position of no one type of locomotive is secure and builders must constantly look for design improvements and keep their pencils sharp to keep their place in the sun.

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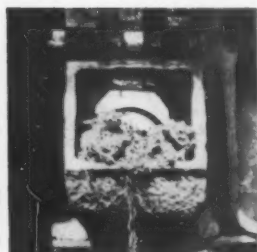
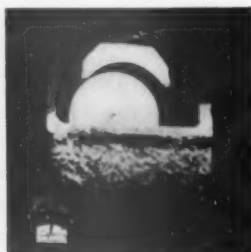
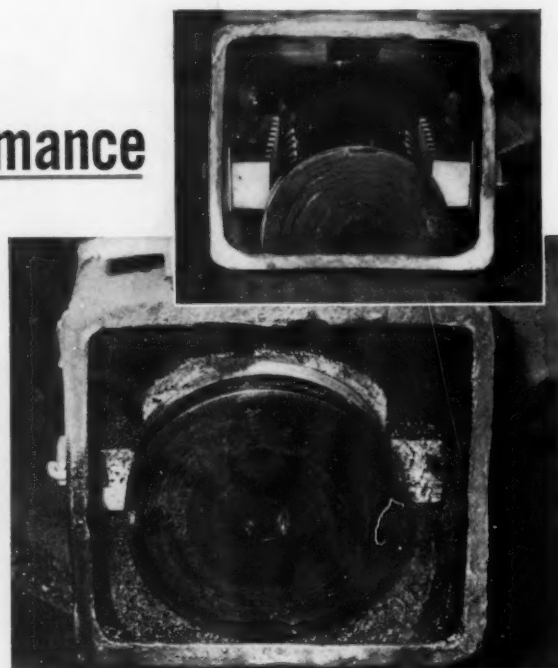


Photo of journal box at impact of 6 mph, showing how bearing is cocked off journal and packing is displaced.



When air and hand brakes are both applied, note how bearing and entire box are raised, compressing packing.



Journal box with R-S Journal Stops after flat switching impact at 11½ mph. Packing is still in proper position. Compare with photos below. Inset shows mounting of R-S Journal Stops with box jacked and packing, bearing and wedge removed.

loading that spreads linings, disrupts oil films. After two years' service, bearings originally applied with test sets of R-S Journal Stops were found to have crown bearing only 2½" to 3" wide — practically identical to conditions found at inspection after six months' operation. Dust guards were undamaged, and there was only slight wear on the Stops.

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New designs permit application of R-S Journal Stops to separable boxes as well as integral-cast boxes — with the same big improvement potential. For complete details write to Magnus Metal Corporation, 111 Broadway, New York 6, N. Y.; or 80 E. Jackson Boulevard, Chicago 4.

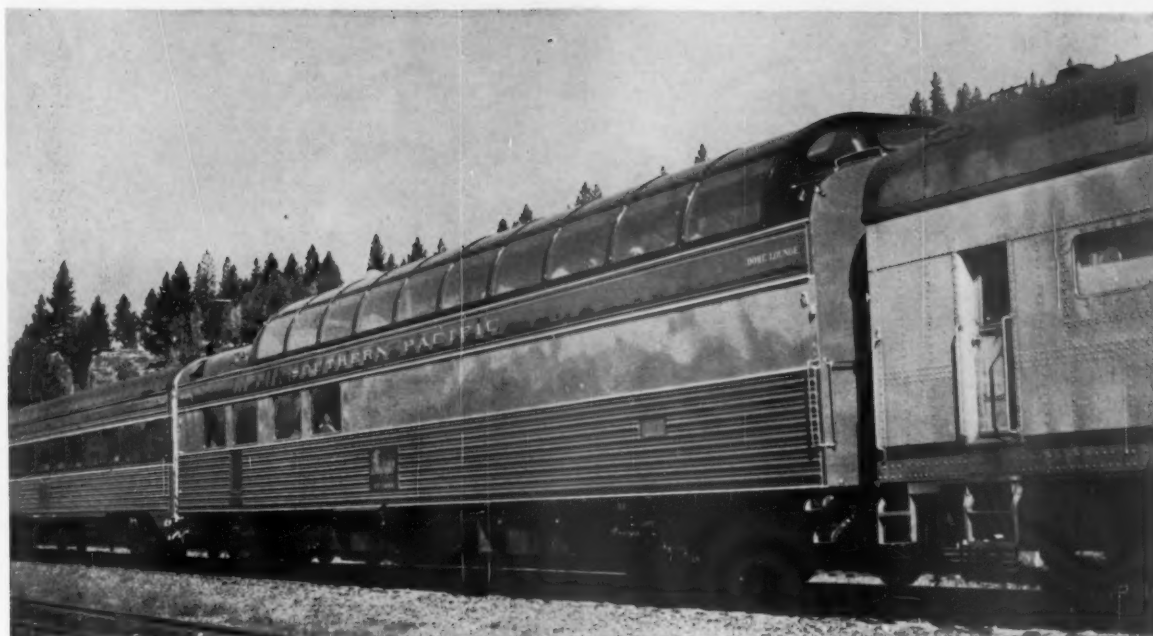
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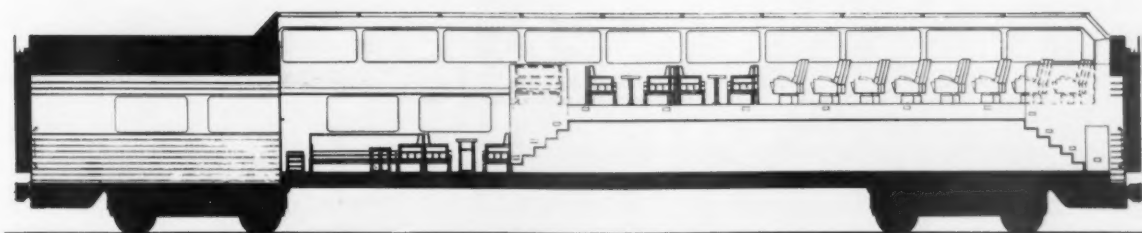


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SP Builds Two-Level Dome Car



A DOME CAR in which there is no depressed floor level between the trucks was recently built at the Sacramento general shops of the Southern Pacific, using the underframe from a round-end observation car acquired in 1937. To provide an entirely new floor plan, the car was lengthened approximately 3 ft. The approximate light weight was increased from 100,000 to 156,000 lb. New Commonwealth four-wheel trucks were installed.

- Converted from an old car.
- Unit combines observation and lounge features.
- Every seat has a dome view.



In the dome, looking back from the lounge and (below) looking from the lower lounge into the upper floor level.



The round-end portion of the car was removed and the car body lengthened to 81-ft 2-in. over platforms coupled, compared with former length of 78-ft 1½-in. The body bolster center fillers and bolsters were modified to accommodate the outside swing hangers and Central Bearings of the new trucks. The trucks centers are 55-ft compared with the former spacing of 53-ft.

The side plates, side sills, center sill and other longitudinal underframe members were spliced to obtain the increased length. New end construction was fabricated and applied to replace the round end construction. Some of the windows were eliminated and some in the lounge section were relocated. The side plates and side sills were reinforced and high-tensile, low-alloy steel sheathing was welded to the car framing, obtaining a girder type side construction.

A structural crossie was provided at side-plate height at the partition separating the upper and lower lounges.

A new floor of 1-in. Plymetl, suitably braced, was applied 4-ft 7¼-in. above the normal floor height, extending for a distance of 42-ft 4¼-in. inside one end of the car to provide an elevated seating area. This elevated floor was provided with a depressed center aisle 13-in. deep to allow overhead clearance below the main air duct.

Stainless-steel structural members for the 61-ft 8⅜-in. dome structure, purchased from an outside builder to SP design, were shipped to Sacramento where the dome was built, covering the lower and upper lounge and coach sections. The top of the dome is approximately 20-in. higher than the roof of a conventional car.

Vestibules Eliminated

This is a through car, there being no vestibules. End doors are of the sliding type. At the entrance to the coach end are six steps leading up to the elevated coach and lounge sections. The four single and twelve double seats for 28 passengers in the coach section are placed at a slight angle toward the side of the car for easier viewing the scenery. The upper lounge seats 20 passengers on 10 sofas and has six small cocktail tables.

A partition with safety plate-glass panels divides the elevated lounge from the lower lounge. The lower part of this partition is decorated with natural leaves, in shades of brown, embedded under the glass.

The lower lounge, six steps down from the elevated floor, is also under the glass dome. It has four large glass windows at normal height in the sides of the car. It has seats for 16 passengers. Both the lower lounge and the upper sections are decorated in shades of green and brown. The floor is covered with green carpet.

A bar, with stainless-steel fixtures, adjoins. Beyond the bar at the end of car is the valet's quarters.

The SP dome car has two identical 7½-ton capacity air-conditioning systems, each including a Waukesha ice engine, Safety full-flooded condenser and Trane overhead fan and evaporator. Compressors, propane engines and fuel tanks are placed beneath the car-underframe. The Vapor automatic heating system includes Solar Discs which function to lower the temperature setting of the thermostats in the dome when subjected to the heat of the sun. This varies from ½ to 4 deg. depending upon the intensity of the sun.

Under the upper floor level are located a blower and coil for the air-conditioning system at the rear end of the car, supplying conditioned air through ducts at the



The bar at the end of the lower lounge.

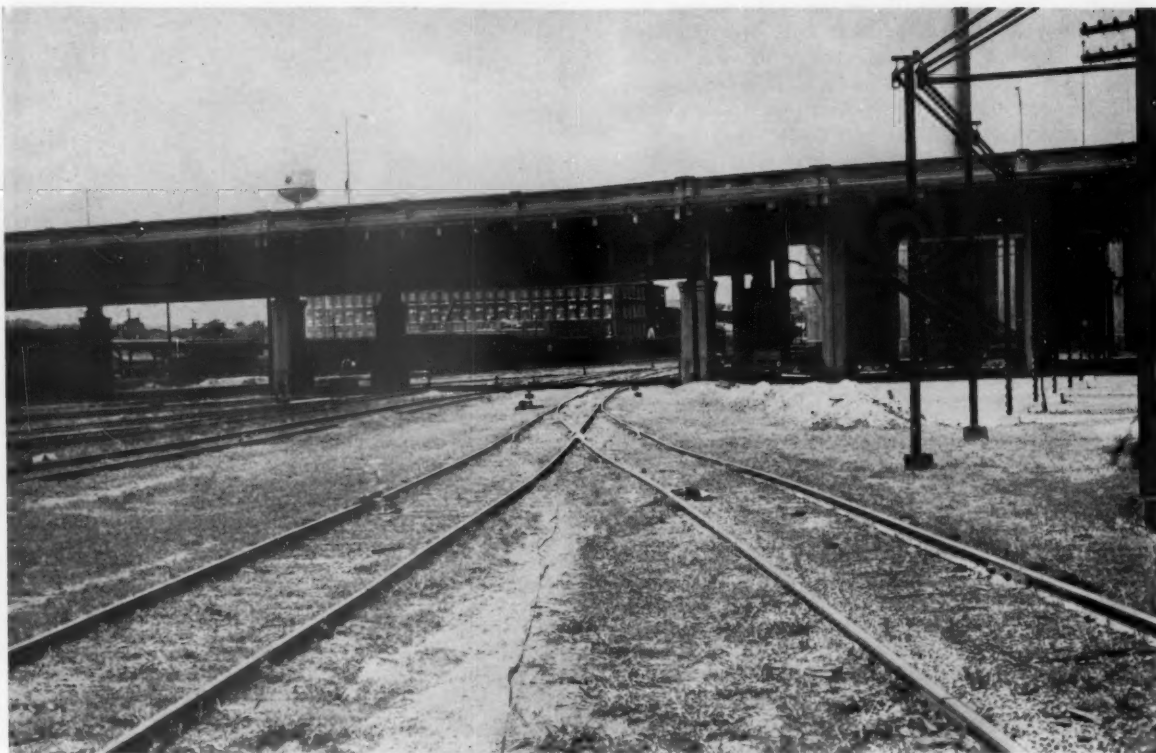
end of the car into the overhead air duct. Another cooling unit is located over the valet's room. Also under the upper floor level is considerable storage locker space.

The Sacramento shopmen, who built the new SP type dome lounge car, were the first to ride in it, on special runs between Sacramento and San Francisco (July 24 and 25). Representatives of all the crafts engaged in the car's construction and members of their families were present at the invitation of President D. J. Russell who said: "We are proud of the Southern Pacific people whose skills and enthusiasm were responsible for designing and building our new dome car. We scheduled these special trips because SP recognizes that the shopmen and their families take great pride in their work."

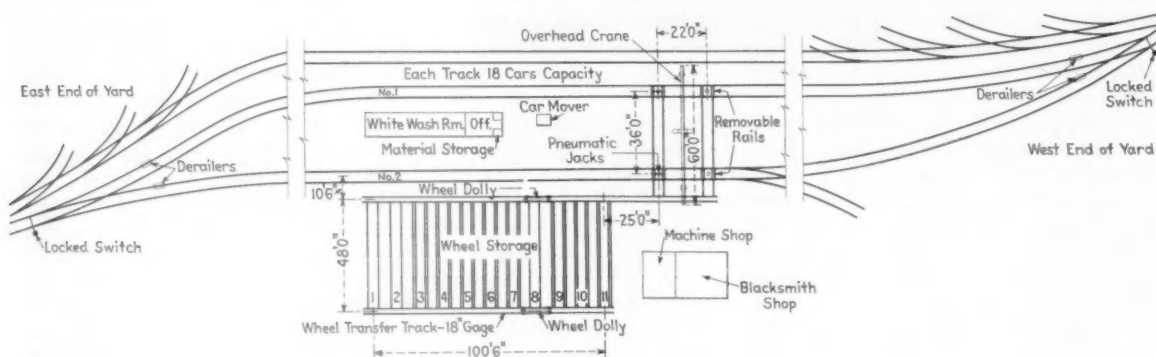
Like other dome cars, the Sacramento-built model has two levels, but SP car engineers designed the levels in a terrace effect so no passengers are seated beneath the upper level and so all 64 seats have a dome view. Design and engineering of the car was planned under the direction of B. M. Brown, general superintendent of motive power, San Francisco, Cal. Its construction was carried on at the Sacramento shops, along with an extensive freight car building program, under the general direction of Frank E. Russell, superintendent of motive power, and F. E. Molloy, assistant superintendent.

Among the craftsmen who worked on the dome lounge were carmen, millmen, cabinetmakers, upholsterers, painters, pattern makers, sheet metal workers, pipe fitters, blacksmiths, machinists and electricians. All are employees of SP's general shops at Sacramento, Cal.

The dome car is now being operated in various trains on SP lines to get reactions of passengers and to give the road an opportunity to test the car under actual operating conditions.



Repair tracks No. 1 (left) and No. 2 (right) with train yard in the background. The derailer is locked on the rail of track No. 1. The derailer is off and the switch open to track No. 2. These tracks are connected to the train-yard switching lead at both ends.



Central of Georgia

Rip Track Moves Cars Fast

This article, which was written by Glenn W. Burke, master mechanic of the Central of Georgia at Columbus, Ga., describes an improvement in the handling of bad-order cars at the Columbus train yard, which is a by-product of dieselization.

THE ACCEPTED PRACTICE for years among railroads has been to designate a track in a yard to which bad-order cars are switched and from which they are again switched

to a shop repair track. When they are repaired there, they are then pulled and forwarded to destination. This often results in a day's delay to the shipment and payment of a day's per diem, besides the danger of creating a dissatisfied shipper and a dissatisfied consignee.

When the Central of Georgia became completely dieselized, two tracks at Columbus, Ga., adjacent to the yard, previously used for the storage of coal, were released. These tracks are 947 ft long and have a space of 36 ft



The car puller by which cars are spotted can move them to the work location from either direction. The puller is a converted coal-chute hoisting drum and motor.

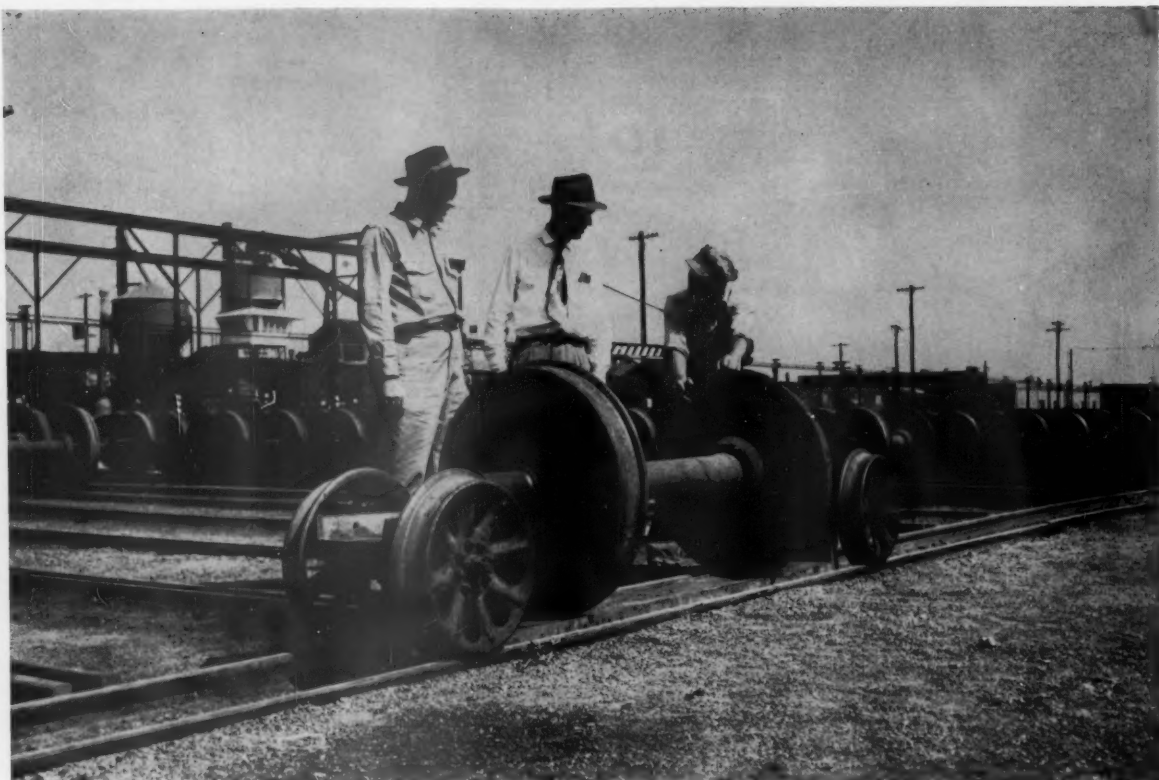
- Two tracks are part of transportation yard.
- Cars are kicked onto one while other is worked.
- No yard engine needed for spotting cars.
- Repaired cars immediately returned to yardmaster.

between them. With minor alterations, they were converted into running-repair tracks where all classes of repairs, except heavy, are made 24 hrs per day, 7 days per week.

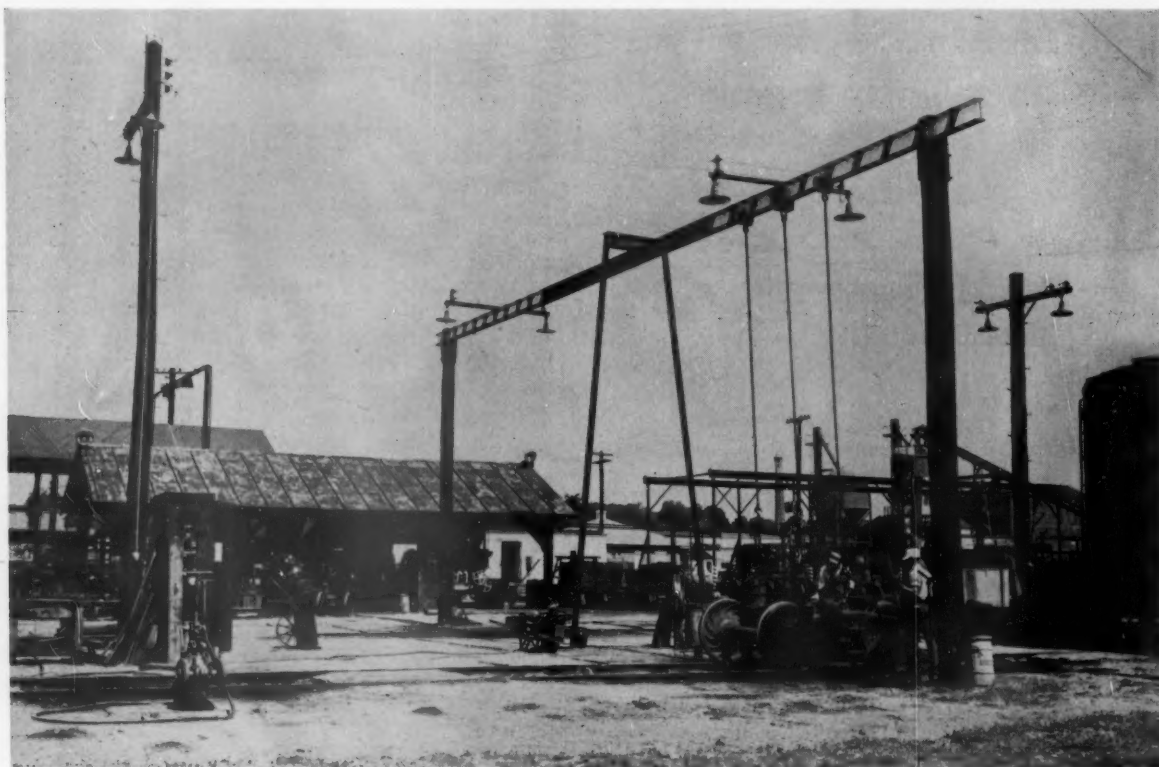
With the installation of adequate lights and the transfer of facilities and men from the shop repair track, a work location, with all necessary materials and tools, was made available. This work location is halfway between the switches, and a car spotter is used to pull cars to position for repairs, thereby eliminating the use of a switch engine. A derailer, equipped with shop lock, is placed on each end of each track. The switches are likewise equipped with shop locks and only the lead carman of each shift has possession of a key.



After completing inspection of inbound and outbound trains, inspectors return to the repair track to work on the cars which they have bad-ordered.



Wheels are moved on the buggy from the storage tracks to a transverse track at the work location. Left to right are Chief Car Inspector E. P. Curry, Master Mechanic Burke and Lead Car Man Lee Stokes.



Changing a pair of wheels at the work location. The blacksmith shop is shown at the left.



The work finished, the yard master is notified and the car moved back into the train without missing the schedule.

The switching lead where trains are switched is connected to these repair tracks. One of the tracks is kept open, with derailler off and switch lined, so that bad-order cars may be kicked to this track by yard engines while carmen are repairing cars on the other track, which is kept closed and protected by locked switches and locked deraillers, making it impossible to subject the men at work to injury.

This work location is the heart of the operation. Briefly it consists of a monorail 22½ ft high, extending across both tracks, with three 1½-ton pull-lift jacks suspended on trolleys for all truck work, including wheel changes, truck bolsters, and truck sides, and for coupler applications, load adjustments, rehangs doors, etc.

In addition, there are in this area eight small jacking pads, brake cylinders in the ground between the rails with extensions for handling wheels with air, four 50-ton air jacks, cutting and welding torch equipment and wheel-storage tracks with a small buggy, which enables one man to bring the wheels to a car for application to its truck.

It is possible to have as many as 18 bad-order cars on these repair tracks at one time. However, since this service was inaugurated on November 9, 1953, there has been no occasion when the maximum number of cars were on the tracks. Repairs are made and cars turned back to the

yardmaster as quickly as they are placed on the tracks.

No distinction is made between loads and empties. Both are repaired promptly as they are set out on the repair tracks. The carmen who make the repairs are the same men (inspectors) who work in train yards inspecting in- and outbound trains, classifying cars, closing dump doors, running air-brake tests on outbound trains, etc. It frequently occurs that the man making the repairs is the same man who bad-ordered the car.

As these running-repair tracks are operated 24 hrs a day, overtime has been entirely eliminated. This was done by dividing the force that formerly worked at the shop repair track eight hours per day Monday through Friday into three 8-hr shifts and spreading the assignments to cover the full day. It was not necessary to add to the inspection and repair force to change over to this 24-hr operation.

No attempt has been made to estimate what this repair service—which enables bad orders to go through on schedule performance—means to the railway in creating revenue. However, we do know that effective operating service and a high standard of performance beget satisfied customers and good will toward the railway, which are inescapable factors to consider in potential business.

Bad-order cars are not delayed at Columbus.



How Low-Grade Fuel Oils Perform

Cheaper fuels can be used in locomotive engines, but a study of the factors involved indicate that economies may be questionable.

THAT MANY RAILROADS have already accepted in principle so-called low-grade fuels for locomotive diesels was brought out in four-way discussion at the Southeastern Railway Diesel Club's August 10 meeting at which four speakers considered not only supply and price, but the effect on engine performance and engine maintenance as well.

Dr. F. A. L. Holloway, general superintendent of the Baton Rouge Refinery of the Esso Standard Oil Company, dealt at length with the matter of supply and price of several types of fuels and the possible rela-

tionship of these factors to overall economies. Dr. J. W. Ryznar, technical director, National Aluminate Corporation, told of the role of chemical additives with respect to low-grade fuels. Both W. King Simpson, technical director Fuels and Lubricants, Electro-Motive Division, General Motors, and Harold Sennstrom, chief application engineer of American Locomotive Company, directed their remarks to the effect of these fuels on engine performance and the ultimate cost of maintenance.

Abstracts of the papers by Messrs. Sennstrom and Simpson follow.

Performance of Alco Diesel Engines on Low Grade Fuels

By H. R. Sennstrom

OVER A PERIOD of several years the American Locomotive Company has engaged in a series of tests in an effort to determine the effect of poorer grade fuels on the performance and operational conditions of Alco diesel engines. The tests embrace a variety of fuels, and were conducted under both laboratory and railroad operating

conditions. Because of the complexity of fuel characteristics, it is difficult to draw any final conclusions. Within the limits of the tests however the Alco diesel engines are obviously capable of successfully utilizing some types of lower grade fuels.

The tests described herein are confined to applications

of low quality fuels in Alco 12- and 16-cylinder, Model 244 railroad diesel engines. Broad experience, particularly in the stationary field, has indicated that the Alco six-cylinder 12½-in. by 13-in. Model 539 engine, used extensively in 660 hp and 1,000 hp switching locomotives, can successfully function utilizing inferior fuels. Experience, therefore, has indicated that any fuel which can be used in the Model 244 engines can also be used in the Model 539 engines.

For some years the specification recommended by Alco has been ASTM 2-D with a flash point of 130 deg F. This specification limits the cetane value to a minimum of 40, sulphur to a maximum of 1.0 per cent, and requires that 90 per cent of the distillate shall be recovered at 675 deg F. The pour point, which is only significant in those areas subject to cold weather operation, is given as 0 deg F. or below. The adoption of the ASTM 2-D made possible the use of No. 2 heating fuel in place of No. 2 diesel fuel in many parts of the country and was therefore responsible for a saving of up to ¾ cents a gallon.

The practical significance of cetane number is emphasized under diesel engine starting conditions. In an effort to determine the minimum cetane value, for successful operation of the Alco 244 engine, a test was run in 1947 on a laboratory single cylinder engine. The engine was operated on a series of diesel fuels having cetane values ranging from 30 to 50. It was found difficult to start the engine with 30 cetane fuel, even at room temperature, and the idling condition was quite rough. However, under any load condition the engine functioned smoothly and performance was satisfactory. Using 35 cetane fuel no starting difficulties were encountered and roughness at idle was barely perceptible. Under all load conditions, the engine functioned as well with 35 cetane fuel as with 50 cetane fuel. Although each test was of relatively short duration, no measurable difference in engine operating performance or in engine cleanliness was discerned. It is therefore concluded that, other things being equal, the engine will function satisfactorily with fuels having 35 cetane number and with the aid of starting equipment could operate with fuels as low as 30 cetane.

A test to determine the effect of both high sulphur content and high distillation range fuel on the Model 244 engine was next undertaken. A laboratory 12-cylinder Model 244 engine was used for this test and the operation carried over a 2,000-hour period. The fuel used in this test had a cetane number of 36 and a sulphur content of 1.07 per cent. The initial boiling point was 398 deg F and at 760 deg F, 97 per cent of the material had been distilled. The end point could not be determined because of the residue remaining, although it must be in the 800 deg F range. This fuel incidentally is available in the New York Harbor area and is used in low speed marine diesel engines.

The 2,000-hour operating period was broken down into four 500-hour increments during each of which was employed a different lubricating oil. Inspections were made at the end of each 500-hour run. The four lubricating oils are best described as being respectively:

(1) A high additive type lubricating oil prepared especially for the handling of high sulphur content fuels; (2) A high additive level lubricating oil of the "extra quality" type; (3) An additive type railroad lubricating oil which

is currently in extremely broad usage, and (4) A low level additive oil currently in limited railroad use.

A parallel series of tests were run using the same lubricating oils and using premium diesel fuels for comparative purposes.

The results of this investigation clearly indicated that the Model 244 engines could utilize either the premium diesel fuel or the marine type fuel with equal ease. While cleanliness, upon examination of the engine, varied considerably with lubricating oil, no variation of consequence could be attributed to the different fuels. It is true, because of the higher heat value in a given volume of the low quality fuel, that it was necessary to reduce fuel rack settings slightly so that the tests were operated under the same engine horsepower output conditions.

As a party to the efforts of the Coordinating Research Council full-scale railroad testing program, the American Locomotive Company, together with the Texas Company and the Lehigh and New England Company, joined forces to undertake a full scale test of a fuel the cetane number of which was 39, end point 644 deg F and containing .9 per cent sulphur. Two 1,500 hp road freight locomotives belonging to the Lehigh and New England were fitted with measured powered assemblies and were operated in regular freight service for a total of 72,000 miles. One unit operated on the test fuel and one unit operated on a straight run No. 2 premium diesel fuel. The same lubricating oil was used in both units and the units were coupled for substantially the entire duration of the test so that they operated under identical conditions. No difficulty was encountered during the entire test and an inspection of the engines at the conclusion of the tests again indicated no difference in condition—cleanliness and wear being the principal criteria in this inspection.

The Coordinating Research Council program includes another test involving the Alco Model 244 engine, which test was started in June 1954, and is scheduled to operate for a period of one year. This test involves four 1,600 hp road freight units on the Chicago and North Western and is being operated in conjunction with that road and the Shell Oil Company. The general nature of this test is the same as that of other Coordinating Research Council tests and this one is of particular interest because the test units are being assigned to heavy freight service and the fuels will be more rigorous in their characteristics than the test already completed on the Lehigh and New England railroad.

The tests described thus far utilized the Alco Model 244 engine in its standard production configuration. No non-standard equipment was applied to the locomotive in any of these cases to utilize the test fuels. These tests indicate that the Alco 244 engine can successfully utilize fuels of the general type described above. However, no final conclusion has yet been drawn since further experience is necessary. Because of the many variables encountered in various fuels it may be necessary to qualify, by test, each individual low quality fuel rather than to attempt this qualification by the terminology of a specification.

There are other factors involved in low quality fuels which can only be controlled by the use of special equipment applied to the diesel engine. An excellent example of this is found in the case of a major pipe line company, utilizing Alco Model 244 engines in pumping stations, where the crude oil passing through the pipe line

is used as the fuel. This particular crude is an excellent fuel oil except for the large quantity of dirt carried in suspension and an extremely high cloud or waxing point. To eliminate the solid matter, it is necessary that the fuel be centrifuged, and this is being done with commercial equipment. Because the wax in the fuel precipitates at approximately 90 deg F, it is necessary that fuel heaters be utilized to maintain the fuel temperature at approximately 100 deg F. These engines are successfully burning this raw crude and no difficulty in regard to performance, cleanliness, or wear has been evidenced, or is anticipated. To handle fuels containing residual products, or having high distillation fractions, it is frequently necessary to use cooled fuel injection nozzles to avoid nozzle tip burning. Such nozzles have been applied to Alco Model 539 engines with success for many years. The nozzle is so designed that the cool fuel, prior to injection, is circulated in cooling passages through the body of the nozzle and the nozzle holder. Similar equipment is easily made

available for the Model 244 engine should such an application be desired.

In some cases corrosive fuels have been encountered. To combat this situation, fuel injection equipment manufactured of stainless steel has been successfully used on Alco Model 539 engines.

Low pour- and cloud-point fuels can, of course, be heated as required. Such heater applications are commonly found on locomotives operating in the northern states and in Canada.

The fundamental problem facing the builders of diesel engines and of fuel handling equipment is one of describing the problem and anticipating the needs of the customer rather than the particular technical aspects of low quality fuel handling and utilization. If the oil industry can provide the railroads with cheaper fuels of the nature discussed in this paper, in quantity, the equipment manufacturers can certainly develop economical means for handling and using such fuels.

Economics of Using Low-Grade Diesel Fuels in GM Engines

By W. King Simpson

What Is a Low-Grade Fuel?

It appears likely that the term, "low-grade diesel fuel," means something different to practically everyone employing the phrase. Perhaps if we consider that low grade diesel fuel simply means diesel fuels involving lower prices than normal we might be closer to the conception that the railroad man has in the definition of a low grade fuel. Practically every Class I railroad in the United States has been giving consideration to the procurement of fuels under more favorable price levels. Many of these roads have already accepted the so-called "low grade fuels" and have been utilizing them for some time.

What Are the Railroads Buying?

For purposes of this discussion and to simplify the classification of the types of fuel that are being purchased by the railroads at the present time as low-grade fuels, we will arbitrarily say that they have three general classifications: (1) heating oils; (2) higher pour-point fuels; and (3) residual fuels or their blends. Of these three types of fuel, at the present time the most common ones being employed by the railroads in the category of low grade fuels are burner oils.

The physical properties of burner oils are similar to the straight-run diesel fuels except that they tend to be somewhat lower in API gravity and, of course, lower in cetane number. Even though there has been a substantial swing to the use of these fuels in the past year under the term of low-grade fuels, these burner oils have been utilized in GM engines for the past seven years. In 1947 EMD was actively engaged in field testing these products and quite a few railroads have been using this type of fuel for years. When the railroads were purchasing 50 cetane straight-run fuels, the burner oils at 45 cetane were being offered at a lower price. In recent years, some of the straight-run, cracked blends of burner

oils are regular type diesel fuels and the lower quality burner oils of about 40 cetane are being offered in competition with these fuels. Currently, about the lowest cetane number fuel being offered for GM equipment in a catalytically cracked product would have a 35 cetane number with a 28-deg API gravity. Obviously, this low gravity means about 4 per cent more Btu's per gallon which will be obtained through the use of this fuel as compared to one with an average gravity.

High Pour-Point Fuels

The second general group in the available low-grade diesel fuels today would be the ones having higher pour points. In the northern half of the United States, the winter operation usually requires a fuel having a pour point somewhere around -10 deg F. The high pour point fuels in this discussion would include products having pour points of +25 deg F on up to +80 deg F. The high pour point fuels being offered for use in GM Series 567 engines includes two different types of products. One would be a high quality, normal diesel fuel in every respect except that due to its paraffinic nature, it would require heating to compensate for the tendency of the fuel to become waxy. The second type of product having a high pour point would involve a product having a much higher boiling range than normal. These could be fuels which were distilled at the refinery by steam or vacuum so that they will not decompose. In order to estimate their true boiling range in the laboratory, it is necessary to vacuum distill them and convert their boiling points to atmospheric pressure by means of a convenient nomograph. We have burned fuels of this type in GM Series 567 engines where their end points would be as high as 1,050 deg F. Whichever type of high pour point fuel is involved, it is obvious that special provisions must be made to insure that the fuel is heated.

Residual Fuels or Their Blends

This type of fuel (residual) is generally classified as a Bunker C or an ASTM No. 6 fuel. Other varieties of the fuel would be this product diluted with various amounts of diesel fuel. Although the ASTM No. 6 fuels represent a wide variety of fuel properties ranging from fairly good quality fuel to products similar to asphalt, these products actually have been offered to the railroads as de-graded fuel. Although we have been doing quite a bit of work on the engine test stands at La Grange with these fuels, little has been done on railroad property in attempting to utilize fuels of this type. From the nature of this fuel, it is obvious that the railroads should do most of their work on the burner oils and high pour point fuels before they attempt the residual fuel group or their blends.

To summarize, the three classifications of low grade fuel presently being offered and utilized in our equipment are: (1) the burner oils which are low gravity, low cetane products quite commonly used as low grade products and in general are quite satisfactory for use in GM engines; (2) the high pour point fuels are a nuisance from the handling viewpoint because they require heating; when the necessary fuel heating facilities are employed, GM engines perform satisfactorily on these fuels; (3) the residual fuels or their blends are definitely de-graded products and are also a nuisance to handle because of the heating and filtration precautions required. For this reason, these fuels do not appear to have suitable attributes for railroad operation. They may have better applications for GM 567 engines in stationary service, where additional fuel handling facilities may be installed.

Filter Problems

As a general rule fuel filter problems will be more prevalent with any one of the three groups of fuels previously mentioned. Whenever this type of problem exists, the large scale filtration equipment on the railroad property will be in trouble as well as all of the filters on locomotives. A large percentage of the burner oils will not introduce any more of a filter problem than previously encountered with ordinary fuels. Most of the high pour point fuels appear to give difficulty, and perhaps some of this is due to the wax itself. The residual fuels or their blends appear to give more or less constant trouble to filter elements.

The formation of insoluble residue or sediment in the fuel while it is being stored is the cause of the eventual filter plugging. In order to minimize the formation of this residue or sediment, fuel oil additives are quite commonly used as has been mentioned in this section today. The use of these additives has resulted in a secondary problem involving fuel tanks which contain deposits. These tanks, either on railroad property or under the locomotives, have had the new type of additive fuels added to them, and unfortunately, some of these additives have been effective in cleaning the tanks so that the residue which was clinging to the sides of the tank went into solution, or was held in suspension by the action of the fuel additives. In somewhat the same way, another problem has been encountered in the use of certain types of fuel additives which promote fuel-water emulsions which are very difficult to break.

It should be easy to surmise that with more problems of fuel filtration that injector problems might also be

encountered and, of course, this has already been noted under some operating conditions. As mentioned previously, one of the most troublesome problems encountered has been the action of certain types of fuel additives on the gum residue and dirty fuel tanks. From the type of trouble encountered, it is evident that the additives can carry this gum through the fuel filters into the fuel injector. A simple inspection of the injector parts after it has been disassembled will indicate the presence of a gum formation on the fuel side of the injector plunger and bushing. It is possible to do detective work on the parts of an GM injector and it is relatively simple to identify this type of difficulty by a simple inspection of the parts. Injector difficulties represent a relatively small number of complaints and in general, most burner fuels do not promote this type of problem.

Lubricating Oil Performance

Lubricating oil performance while using the lower grade diesel fuels tends to result in more rapid oxidation rate of the oil. Under these conditions shorter effective lube oil filter life also will be noted. From this it is not surprising that more engine deposits will be encountered. The question then remains as to whether the deposits are harmful to the engine operation. For instance, slightly heavier deposits may be beneficial on the piston skirt and liner in actually reducing the wear rate of these parts. On the other hand, heavy deposits in the compression ring area might be quite harmful and cause ring wear.

Engine Performance

GM 567 engines will operate on the burner oils and high pour-point fuels without any marked evidence of change except perhaps that they will develop slightly more smoke under adverse conditions. The horsepower developed by a GM engine under standard conditions is a direct function of the number of Btu's per gallon in the fuel employed. Since practically all of the low grade diesel fuel being used at the present time contain more Btu's per gallon, it will be found that Series 567 engines are developing more horsepower. This may amount to as much as 8 per cent. Actually, of course, the burner oils would be more in the range of 2 to 4 per cent more horsepower. Otherwise, the everyday performance of Series 567 engines would be practically normal. After extended periods of operation involving several years' time, there will be somewhat great piston ring and cylinder liner wear. Although this wear rate will be somewhat greater in most cases than the operation on a regular railroad diesel fuel, the condemning limit for wear probably will not be exceeded. In the case of the liners, usually it will not be necessary to re-bore the liner to the first oversize standard. For this reason, the difference in wear rate will not be important because the ultimate life of the liners will be the same as previously encountered with regular railroad diesel fuels.

Modifications Needed for High Pour-Point Fuels

The use of high pour-point diesel fuels will necessitate heating of the fuel in order to insure fluidity. Some of these high boiling fuels have a pour point as high as +80 deg F and they could range downward to +20 deg F. and still require fuel heating in the northern half

of the United States. Anyone who has considered the use of this high pour point fuel will realize all of the difficulties which are involved. The high pour-point fuels must be heated before they can be unloaded from the tank cars, the fuel must be heated in the railroad storage tank and the fuel must be delivered to the locomotive fuel tanks while it is quite warm. In turn, the locomotive must be provided with insulated fuel lines, fuel tanks and a special type of heat exchanger to insure that the fuel remains warm enough under all conditions of locomotive operation.

Economics of Engine Operation

There isn't much reason for the railroads to use low grade diesel fuel in GM engines, unless there is a favorable balance involved which will permit them to save money on the purchase of this type fuel as compared to their normal railroad fuel.

Potentially, there is a large amount of money involved and the economic picture could be very favorable. For instance, since diesel fuel is selling for approximately 10 cents a gallon, a saving of one cent a gallon would amount to a 10 per cent saving on the cost of fuel. Since the diesel fuel cost in the operation of a road locomotive amounts to approximately 65 per cent of the total operating cost, it is apparent that a saving of one cent per gallon would amount to a reduction of six and one-half per cent on the total cost of the operation of the locomotive. The extra Btu's per gallon of the heavier fuel represent another item of saving.

To express this in another way, there is a railroad in the middle west employing approximately 400 GM road units, and it is spending \$9,000,000 a year on diesel fuel. A saving of one cent a gallon would amount to \$900,000 per year. A railroad with only 400 road units does not involve a particularly large operation. We must concede then that potentially, the economics of operation on low grade diesel fuel are favorable, providing, of course, the margin is adequate and the difficulties not too severe.

On the unfavorable or detrimental side of the economic picture, it is mandatory that the low-grade fuel shall not cause any road failures. Enough vigilance and maintenance must be performed so that these difficulties will not occur. It will require more inspection of filter elements and the performance of the injectors must be

watched. The rate of deterioration of lubricating oil should be noted, which probably will not increase the work load of the laboratory over normal practices. The additional increase in wear rate of the engine parts, particularly the rings and liners, must be evaluated. In most cases this increased wear will be of an academic nature because the life of the part will not be affected to such an extent that it will be condemned earlier. Even of some item such as piston ring wear became troublesome, we could replace our present inexpensive piston ring with a more expensive type which would probably resist this type of wear.

The continuous heating of diesel fuel for the entire railroad appears to be one of the most unfavorable aspects in the economic study of low grade fuels. Based on a saving of 1.5 cents per gallon, the break-even point for the additional equipment which must be employed would be around 18 months. A western road has made a cost estimate and it appears from its figures that approximately \$1,400 a unit would be spent on providing the necessary heating facilities aboard the locomotive. Also, some \$3,000,000 would be required to make the tank cars available for heating and to provide adequate heating facilities on all railroad storage tanks. Even after the installation of all heating equipment, there will be a continuous requirement of Btu's to provide for heating the fuel which has no other useful purpose than to promote convenient fuel handling.

In summary, the movement of the railroads to lower grade and lower cost diesel fuels is already with us. There are local situations which make this situation attractive whenever the fuel is available. Many medium quality fuels are classified in the low grade bracket because they are sold at lower prices and obviously, these fuels will perform satisfactorily. The "cat" cracked fuels, other than for stability problems, are performing well in GM engines and many of them are actually low sulfur products which, of course, is advantageous from the standpoint of engine wear. The high pour-point fuels that require heating appear to be unlikely products for use in railway diesel engines due to their difficulty in handling and the elaborate facilities which must be provided for their utilization in our diesel engine. The ASTM No. 6 fuel or its blends do not appear feasible for use in GM 567 railroad engines due to their inherent nature.



Erie Photo

Each year, for the past five years, the International Nickel Company has sponsored a Railroad Corrosion Conference at Wrightsville Beach, N. C., which has brought together from 50 to 75 railroad test engineers, mechanical engineers and others in the industry that are vitally interested in the problems of corrosion of railroad equipment, such as cars and locomotives, and railway facilities, such as bridges and buildings. At the same conference the sponsors have brought together a group of men in the manufacturing field who are recognized authorities in the subject of materials, the effect of corrosion of various kinds on these materials and the manner of conducting both laboratory and field tests to determine what the corrosion problem really is and what the indicated solution may be.

This year's conference was held during May and the character of the conference was varied somewhat from the meetings of previous years in that there were no formal papers but a group of formulated questions, carefully prepared in advance, on

various phases of several different mechanical and engineering subjects. All of these have to do with corrosion, in tank cars, refrigerator cars, in condensate lines in boiler plants and the use of fire-resistant paints for equipment and facilities. The answers to these questions came out of the discussion from the floor and from the technical representatives of the manufacturers represented. The several sessions of the three-day meeting were under the chairmanship of Frank L. La Que, now vice-president, International Nickel Company and an internationally known authority on corrosion. The Harbor Island Testing Laboratory of the Nickel Company is located at Wrightsville and the delegates to the Railroad Corrosion Conference had the opportunity to observe the results of some 20 years of laboratory testing of the effects of atmospheric and salt water corrosion on some 35,000 specimens.

Below are a group of significant questions on tank and refrigerator cars and the answers, as they were developed during the conference.

Why Cars Corrode.

Corrosion in Tank Cars

Q—What are the general causes of corrosion in tank cars?

A—Obviously the general causes of corrosion in tank cars are the commodities shipped in them but actually much of the trouble is due to shipping conditions associated with the commodity. Benzol often contains small amounts of water which settles on the bottom of the car and causes considerable corrosion of the bottom of the tank and heating coils. The heating of certain commodities to facilitate their unloading also increases their corrosivity. Oftentimes the consignee does not remove all of the commodity from the car which becomes aerated and hastens the corrosion. Corrosion caused by spillage on the car exteriors also presents a serious problem as do the stones and grit kicked up underneath the underframe and tank bottom.

One of the tank car parts which presents a serious corrosion problem from a safety first point of view is the grating. Some of the high-strength, low-alloy steels, and galvanized and various paints have been tried without success. Wax emulsions have shown some promise in combatting the spillage problem.

Q—What commodities commonly shipped in tank cars present serious corrosion problems?

A—Some of the most troublesome commodities transported in tank cars are: (1) Paper mill products including tall oils, lignin, black sulfate and hardwood cooking liquors; (2) Sulfur; (3) ammonium nitrate; (4) Fertilizer solutions; (5) carbon bisulfide; (6) carbon tetra-

chloride (with water present); (7) 85 per cent phosphoric acid; (8) benzol (with water present).

Q—What materials of construction are used to resist corrosive loadings?

A—Types 430, 304 and 316 stainless steel are used for concentrated nitric acid. The pure aluminum grades 2S and 3S are used for products such as hydrogen peroxide and certain grades of glacial acetic acid. Lead-lined cars have been in service for several years successfully with phosphorous trichloride and storage battery acid.

Nickel clad is recommended for benzyl chloride, high purity caustic soda, ethylene dibromide and phenol. The stainless clads are used principally with high quality products requiring a very low iron contamination.

Q—How are protective metallic linings generally applied—e.g. cladding, lining, plating?

A—Cladding is generally done at the steel mills and the composite material fabricated into the tank although some cladding has been done by plug or strip welding sheets but this method has economic and mechanical disadvantages. General American Transportation Company has developed an electroless nickel plating process which is identified by the name Kanigen and experiments are underway to evaluate the protective qualities of tank cars plated by this process. Some electrically plated nickel-lined cars have been in service for several years successfully handling caustic soda but the process is covered by patents and has not been widely adopted.

Q—Is it necessary to heat treat tanks with corro-

sion resistant metals after fabrication and what temperatures are used.

A—The tank car specification requires that all tanks fabricated by welding regardless of their composition must be stress relieved at a temperature in excess of 1,100 deg F. The stainless and the stainless clads are all stress relieved at 1,100 deg F. By using low carbon grades of Types 347 and 430, carbide precipitation and stress corrosion are not much of a problem. However, Types 304 and 316 in standard commercial grades with their higher carbons which require the temperature to be below 1,100 deg F within 6 min are avoided whenever it is possible. Some smaller tanks of these compositions have been fabricated and they were drawn through a series of water sprays to arrive at an acceptable cooling rate. With Types 304L and 316L carbide precipitation is not a problem but to meet the code requirements they are stress relieved at 1,500 deg F which is below the critical range for sigma formation.

One of the large fabricators of stainless vessels conducted some work on Type 347 stainless steel which was fiber stressed to about 33,000 psi and then stress relieved for various times. About 22 per cent of the stresses are removed in 15 min at 932 deg F and after 30 min all of the stresses are removed. The conclusion is that anything over 15 to 30 min is not beneficial and merely ties up the furnace.

The question of induced thermal stresses from the drastic quenching from 1,500 deg F on the higher carbon grades was discussed and the view was expressed that perhaps these stresses would be greater than those induced by welding. Some cold formed stainless test pieces were heated to 1,900 deg F and quenched and it was found that they were attacked more severely in a magnesium chloride solution than before the heat treatment.

Q—What types of organic coatings are used and for which commodities?

A—Some heavy mastics are used for transportation of sulfuric acid where the coatings cannot be maintained but they are applied heavy enough to provide adequate protection.

Microcrystalline wax emulsions applied in two coats to a minimum of 6 mils has also been tried for sulfuric acid.

Q—How are these linings affected by cleaning compounds?

A—The National Association of Corrosion Engineers Committee on Tank Car Corrosion is trying to prepare a chart which will tell the user what type of cleaning to use for each individual lining because some of the organic coatings have been damaged by improper cleaning procedures.

Q—What extent has cathodic protection been used to prevent corrosion or product contamination?

A—This type of protection has been used in nickel clad or nickel plated tank cars used in high purity caustic soda and is covered by U. S. Patent 2, 526,878 which has restricted its use. Cars transporting benzol have had magnesium anodes placed in their bottoms between the treating coils and the tanks. After one year of service the weight of the magnesium anodes was unchanged which might indicate either the manufacturer has changed his practice to eliminate the water in the benzol, the anodes

are not effective, or the water was dispersed in globules and not a continuous film.

Q—What materials are generally used for valves in cars handling corrosive materials?

A—The composition of the valves depends on the commodities being handled and include Ni-Resist, stainless steel, Monel and the Hastelloy alloys.

Q—Are any special precautions used to protect the underbody parts when corrosive lading is being handled?

A—The corrosion of underbody parts is not too serious and the only thing which is done is to weld a steel angle drip ledge to the tank car which causes any spillage to fall onto the right of way rather than the car underbody. These parts are generally given a coat of mastic or additional coats of standard paints.

Corrosion in Refrigerator Cars

Q—Are there any data available on the rate of corrosion of steel by refrigerating brines—(1) in brine tanks; (2) interior walls and floors; (3) exterior walls and roofs; (4) tracks and bridges?

A(1)—One railroad which uses overhead bunkers reported that its standard hot dipped galvanized tanks last about eight to nine years. Some aluminum, Monel and stainless steel tanks were placed in test in 1945. The Monel tanks are still in perfect condition in 1954; the aluminum corroded where it contacted the insulation, and the stainless steel has not been examined for years.

A(2)—One of the large meat packers operating a large fleet of refrigerator cars lined and floored a series of cars with 18/8 stainless steel and, after several years of service, they are still in excellent condition.

A railroad operating its own refrigerator cars tested carbon and Cor-Ten steel for interior linings. The corrosion rate in milligrams per square decimeter over an eight months' period was as follows:

	Car No. 1	Car No. 2
Carbon steel	2,420	3,891
Cor-Ten	3,318	4,609

A(3)—This same railroad established the exterior corrosion rate on carbon steels as being 13.9 and 15.5 grams per square decimeter.

A(4)—In order to determine the manner in which brine drippings are dispersed onto the rails and other structures, the AAR conducted an extensive test with a 60-car train, including eight refrigerator cars. It was found that the drippings were uniformly dispersed over the entire web and dried completely before the entire string of cars passed. It was observed that the maximum degree and first indication of corrosion occurs on the web midway between the ties. It was theorized that the distribution of stresses and vibration and the fact that the rails have a slight opening between themselves and the ballast between the ties to hasten its drying after being wetted by dew are probably responsible for the accelerated corrosion in this area.

Q—Has it been possible to devise an accelerated laboratory test which is considered practical to evaluate corrosion observed in cars and on tracks? Does this laboratory test permit a proper comparison between different materials and coatings?

A—Often the technical researcher must develop accelerated tests to meet the immediate demands of the management. In some fields of endeavor substantially valid data may be accumulated. In other fields considerable caution must be exercised in the interpretation of data so obtained. The AAR Research Laboratories have developed a test in which pickled, polished and degreased test coupons of high medium, and low carbon steel are periodically exposed to a series of decreasing relative humidities in order to produce the non-permanent lamellar rust similar to that found on corroded rail.

A plastic rack containing four specimens is placed in a bowl providing a relative humidity of 100 per cent at 120 deg F for 16 hr. In the morning some of the specimens are immersed in a 5 per cent brine solution and others are wet with the same concentration of inhibited brine and stored at 70 per cent relative humidity. After two hours the specimens are removed to another bowl maintained at 40 per cent relative humidity. Two hours later to another bowl at 20 per cent relative humidity. During the two-hour exposure period at each humidity the air is circulated for one hour by a midge fan which is controlled by timers. Because of this transfer, a lower average temperature is maintained during the day, varying between 105 and 110 deg F. At the close of the day the coupons again are immersed in freshly prepared solutions of the same concentration and again stored at 100 per cent relative humidity overnight. The relative humidities are obtained by using saturated salt solutions calibrated for their effectiveness at 120 deg F as compared to their rated effectiveness at 77 deg F. In order to overcome stagnant conditions and to effect a rapid return to the equilibrium humidity, small 0.002-hp motors operating thermostatically controlled fans are installed in the exposure bowls. The salts used are potassium acetate, calcium nitrate tetrahydrate and ammonium sulfate.

At the conclusion of a 30-day test the coupons are photographed and descaled electrolytically by immersing the coupons for 15 min in sulfuric acid inhibited with betanaphthol. This test has been in operation for the last four months and the data obtained are reproduced fairly well from month to month.

A three months' test is now underway wherein groups of specimens will be removed at the end of 30, 60, and 90 days to determine which period gives valid results and to make certain the point where weight loss curves begin to cross one another and level off has been exceeded. As for this method, its use has been confined only to the evaluation of inhibitors. Later large scale field tests will be designed to verify some of the findings. In this test, which is similar in technique to that developed by General Motors, x-ray diffraction studies showed that the rust layers were often equal to the number of cycles of exposure.

The question was raised that some inhibitors when used in improper concentrations tend to intensify pitting rather than to reduce corrosion completely. It was felt that the thickness of the specimens used and by not exceeding the improper limits this pitting effect has been accounted for in the weight loss measure.

It was also brought out that while tests of this type are reproducible their interpretation should be limited to the conditions under which the rust films do not dry out.

Q—What has been the experience with corrosion

resistant materials for brine tanks, drip pans, flues, hatches and interior linings?

A—This was partially covered in question 1(a) but a Monel drip pan has been in service in one of the meat packer's cars for more than two years. However, it is still too soon to show any superiority. Similarly, some Monel roof sheets and hatches have been out about the same length of time. Results obtained in applications in other industries where salt brines are encountered show that Monel has outperformed other materials.

Q—What has been the experience using inhibitors to minimize the affect of brine corrosion?

A—One of the Canadian railroads tested between 15 and 20 different types of inhibitors and established that by using the inhibitor in .5 per cent by weight of the salt added during icing they were able to substantially reduce their corrosion. One of the combinations of inhibitors tested was a mixture of 40 per cent sodium tetraphosphate and 60 per cent calcium chloride dihydrate which reduced the corrosion 96.5 per cent. Another which is closer to that now being used by this railroad contained 55 per cent sodium hexametaphosphate and 45 per cent calcium chloride dihydrate and reduced the corrosion 94.8 per cent. Inhibitors are now being used in all of this railroad's icing stations and it is felt that within five years their refrigerator repair cost will supply the measure of effectiveness of this treatment.

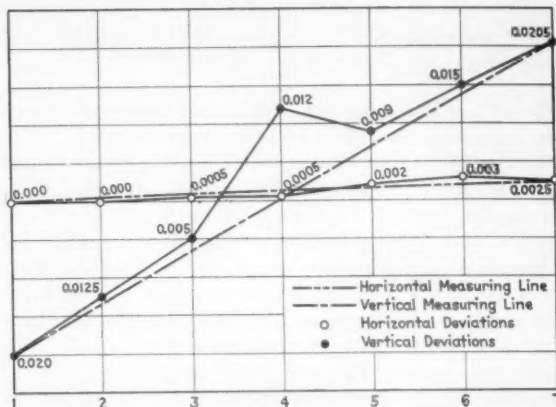
Q—What paint systems are used for refrigerator cars?

A—The recommended system for exteriors specified by one large operator of refrigerator cars is as follows:

1. Sand blasting.
2. Priming with a 25 per cent minimum zinc chromate in the pigment in a linseed oil modified alkyd resin vehicle containing the minimum 40 per cent by weight of non-volatile matter and the latter to contain a minimum of 35 per cent phthalic anhydride.
3. Lap and joints are coated with a 90 per cent minimum red lead in the pigment in an ordinary heat bodied linseed oil.
4. Bolts are also coated with this same primer.
5. The galvanized roofs are treated with a proprietary phosphoric acid etch and primed with the zinc chromate type primer.
6. The hatches, hand brake housings, center sills and all other component parts are also primed with the zinc chromate.
7. The top coat is a drying oil modified alkyd resin enamel with other resins added as required but free from resin and resin compounds and shall contain a minimum of 38 per cent non-volatile which shall have a minimum of 30 per cent by weight of phthalic anhydride. A film of this coating after 72 hr drying without a primer shall not show any defects except loss of gloss after 48 hours exposure in a 3½ per cent sodium chloride solution. The alkaline resistance test specifies that the film must withstand 16 hours immersion in 1 per cent sodium hydroxide. It must also pass the requirements of 14 cycles or 326 hr in the weatherometer without showing loss of gloss, shocking, checking, cracking, blistering or any other undesirable characteristics.

The interior framework, pans, ducts, etc., are coated with a commercial black asphalt but the results have considerable room for improvement.

Main Bearing Bore Alignment By Telescope



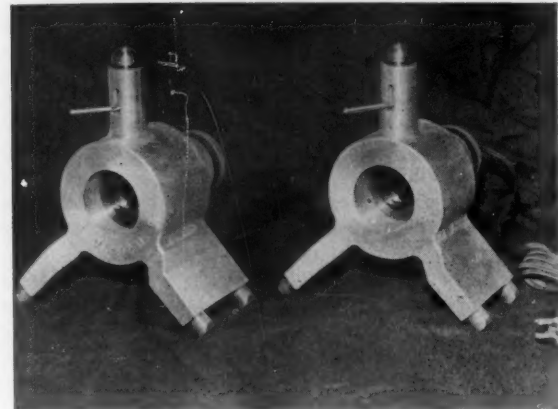
The cause of the step and total misalignment shown on the graph is arrived at by simple interpretation.



Hydraulic jacks line the engine up roughly to the telescope before final aligning of the scope to the two end bores.

The New York Central uses a Leitz alignment telescope to check main bearing bores on all engines undergoing major overhaul at the Collinwood, Ohio, diesel back shop. The engine to be checked is mounted on an accurate layout table, to which the telescope base is also permanently mounted. By means of readings taken by the telescope, a simple graph is filled out which tells completely and accurately the deviations between adjacent bores and total deviations between any two bores. Interpretation of the graph gives the particular cause of any misalignment—bowed shaft, closed-in bearings or other troubles within the engine.

The procedure begins by the overhead crane placing the engine on the layout table with the near bore a minimum of 40 inches from the barrel, as the focus of the instrument is 40 in. to 160 ft. The No. 1 bore is furthest from the telescope (this simplifies laying out the graph later and makes it read direct). The engine is placed roughly



Separate shop-made target holders are used for each bearing size of each engine make.



All types of engines are handled, with an overall accuracy within a half to a thousandth of an inch.

in line with the telescope line of sight by hydraulic jacks. This does not have to be done very accurately because the telescope has a 1-in. horizontal movement of the barrel and a large angular swing. With these adjustments, the final alignment is made of the telescope to the center of the near and the far bearings in the horizontal plane.

Alignment of the telescope barrel to the center of the near and far bore vertically is somewhat more difficult and takes longer as this is done with three adjusting screws on the telescope base.

Both alignments are made by means of a self-centering illuminated target. This target rests on two legs and has a spring loaded pin on top which centers a bead in the center to the center of the bearing. A separate holder, made at Collinwood, is used for each different size bearing on the different makes of engines.

A target with a screw adjustment in place of the spring-loaded pin is used on those engines that run in the saddles instead of the caps. The spring-loaded target cannot be used on these engines as it would be upside down, compressing the spring and placing the bead at some point other than the center of the bore.

With one target placed in each end the telescope is aligned to split the vertical crosshairs of the near and the far bearings. In general, the scope is aligned to the near bearing by the cross slide, to the far bearings by the swing adjustment because the barrel need be turned only a small

angle to adjust for a comparatively large offset at the greater distance.

The barrel is aligned approximately to the horizontal hairlines of the two end bearings by using the adjuster legs under the barrel while keeping the telescope level. When the telescope is finally adjusted, the barrel should be about 0.015 or 0.020 in. low on the rear target and about the same amount high on the far target. This normally occurs naturally because the center line of the bore in a horizontal plane is not usually exactly parallel to the bolting flanges. Therefore with the telescope level the center line between the near and the far bore will vary ten or twenty thousandths high on one end and about the same amount low on the other end.

The practical purpose served in having one end high and the other low is that it puts the line measuring the vertical step and bow at an angle of approximately 30 deg. when laying out the chart. This displaces it at about this same angle from the line measuring the horizontal differentials, making the chart easy to read. The limit of the high and low on each end varies from zero to 0.025 in. The maximum is set by the layout of the chart which reads from 0.025 in. high to 0.025 in. low on along the entire center line.

The operator is now ready to take readings. He places the illuminated target in the No. 1 bore (the one furthest from the telescope) and aligns his mike to take the readings. The process is repeated on the bores working toward the telescope. Each reading is designated as high, low, right or left. When he has completed his readings he removes the target from the near bore and places it

again in the far bore to re-check to see that the telescope has not moved. If the telescope has moved more than 0.001 or 0.002 in. the entire operation is repeated.

The operator then makes out his graph, seated at the lower left corner of the table and facing across the short dimension. In this position the chart reads direct. From either the horizontal or the slant line, up indicates high or right, down indicates low or left.

Horizontal line measurements are plotted with a red pencil, vertical with blue and the center line of the chart with green. On the chart accompanying the article, the big jump at No. 4 on the slant, or vertical measuring line, indicates a closed-in bearing. If the plotted points between Nos. 1 and 4, and between Nos. 4 and 7, were in an approximately straight line, it would indicate a bowed shaft. In the example shown on the chart (12-cylinder V-type engine), the maximum vertical step is 0.010 in. between bearings Nos. 3 and 4, the maximum horizontal step 0.001 in. between bearings Nos. 6 and 7. Vertical bow was 0.0115 in., horizontal bow 0.001 in. After re-boring, the vertical step was reduced to 0.0015 in. and vertical bow to 0.002 in. There was no change in the two horizontal readings, which were well within limits to begin with.

Allowable bow or total horizontal deviation is 0.006 in. for 16-cylinder engines, 0.004 in. in 12-cylinder, and 0.003 in. for 8-cylinder. Permissible vertical bow is 0.002, 0.003 and 0.004 in. for engines with 8, 12 and 16 cylinders. Maximum step between adjacent bores is 0.002 in. horizontal and 0.0015 in. vertical. Overall accuracy of the process is within 0.0005 to 0.001 in.

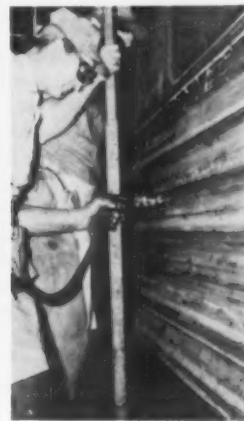


Two wire brushes clean the weld area on both sides of the stainless steel fluted strips.

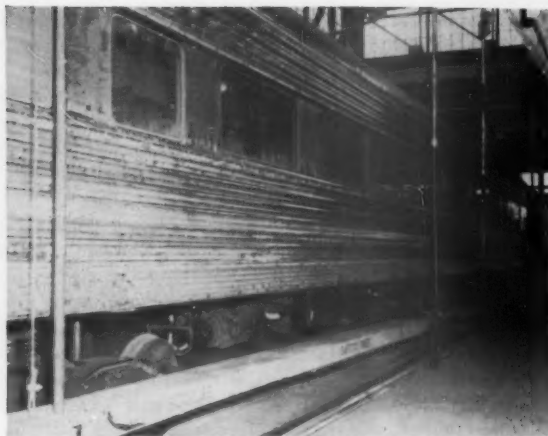
Reconditioning Stainless-Steel Fluting

The stainless steel exteriors of 150 streamlined New York Central passenger cars are currently being removed

and renovated, then re-applied using a new spot-welding method. The reconditioning begins by removing the sidings carefully to prevent damage and sorting the reclaimable strips for cleaning the weld area on both sides. The cleaning is done on a special machine in which the strips are propelled between wire brushes.



The strips (left) are held in position by a few spot welds at the ends and middle using a Heliarc HW-8 gun. The prewelded sections right are applied by a welder and a lever man who holds the strips for welding to the channels.



With top and bottom fluting and snap-on molding applied, the car is ready for polishing and return to service.



Stainless steel $\frac{1}{16}$ -in. channels are arc welded to the car sides, which are sandblasted and primed before the prewelded sections are applied.

The 70-ft. long strips are assembled on a $\frac{3}{8}$ -in. cambered table in groups of seven for the lower section of the car, four for the section above the windows. Spot welding is started at one end to hold the pieces together, followed by a number of spot-welds spaced in the middle of the section and then at the other end. This holds the sub-assembly together for spot-welds in the remaining spaces. The bottom section requires a total of 1,550 spot-welds while the top section needs 980 spot-welds.

New $\frac{1}{16}$ in. stainless steel channels are arc welded to the car sides, and the sides are sandblasted and prime-

coated before application of the pre-assembled siding. To put the siding on, one man operates a lever which holds it in place while another man spot welds it to the channels. The entire bottom section requires 300 spotwelds in this operation, while the narrower top piece needs 225. These welds are covered by lengths of $\frac{3}{16}$ -in. snap on mouldings, and the completed car is ready for final polishing.

Spot-welds are made with a Heliarc HW-8 torch using $\frac{1}{8}$ -in. electrode. Shielding argon flows at 25 cu ft per hr. About 2 cylinders of argon are used for 3 cars. Both sidings and channels are 18-8 stainless steel.

Automatic Welding Aids Gondola Floor Remodeling

A time-saving application in the recent remodeling of 200 gondola cars by the Chicago, Burlington and Quincy Railroad at its Havelock, Neb., shops utilized automatic welding to get the cars back in service with a minimum loss of time. These cars were to be equipped with Nailable Steel Flooring which is held down by a $\frac{3}{8}$ by $1\frac{1}{4}$ in. bar running the entire length of the car on each side.

The bars were fillet-welded by the Unionmelt method to the toe of the side-sill angle and the flooring was next welded to the opposite side of the bar by a second fillet weld also running the length of the car.

Two Unionmelt heads mounted on Oxweld CM-37 machine carriages were used, one for each side. Each machine rode on two 10 ft. long fabricated aluminum tracks which were leap-frogged so that welding was continuous.

Welding speed for the $\frac{1}{4}$ in. fillet weld between the bar and floor was 22 in. per min. at 400 amps., 26 to 28 volts d.c. For the weld between the side sill and bar, the welding speed was 32 in. per min. Welds were made on low carbon steel using Oxweld 3/16 in. No. 29 rod and Unionmelt grade 90 welding composition.



ELECTRICAL SECTION



Fig. 1—Looking west in the truck and wheel repair section of the north high bay area.

Lighting the Big Shop

How the New York Central completely modernized the lighting of its remodeled Collinwood, Ohio shops

THE ORIGINAL STEAM locomotive repair and maintenance facilities at the New York Central Collinwood, Ohio shops are undergoing a complete changeover and face lifting to handle the overhaul, maintenance and all repairs on diesel-electric locomotives.

The steam locomotive shop building consisted of two high bay sections with a low bay section in between. This has been about completed, so far as remodeling is concerned. The north bay was formerly used for general boiler repairs. It is now used for disassembly and overhaul of diesel engines in the western portion. The eastern end of the north bay is now used for locomotive truck repairs, (Fig. 1 and Fig. 3). Both high bay sections are 68 ft wide by 528 ft long; whereas the low bay section, now used as a machine shop, is 100 ft wide and 529 ft long.

The interior of this entire building has been sand blasted, cleaned and painted ivory.

Lighting in both of the high bay areas consists of a combination of 3,000-watt mercury and 750-watt, R-52

incandescent lamps. There are three rows of lighting units the length of the area. The mercury and incandescent units are alternated in each row lengthwise, as well as crosswise. The incandescent units, carrying the R-52 reflector type lamps in high bay Alzak aluminum reflectors in the two outside rows, are the twin type; whereas single R-52 reflector lamps are alternated along the center line with the 3-kw mercury lamps. The mercury lamps are provided with a porcelain enameled steel reflector, having openings along the top, which permit approximately 10 per cent of the generated light to go toward the ceiling.

The spacing between units is 22 ft by 22 ft, and the mounting height is 40 ft above the floor. After being in service for about a year, this area is lighted to a value of about 35 footcandles.

Both high bay areas, so far as control of the lighting and plug-in receptacles are concerned, are divided into three equal sections. Each section is fed and controlled as follows: The power source is brought to the circuit



Fig. 2—The low bay area used as a machine shop. The lighting is supplied by continuous rows of two-lamp, 96-in. fluorescent lamps in porcelain enamelled reflectors which let about 10 per cent of the light go upward.

breaker, from which current is fed to a 480/208/120-volt air-cooled transformer. This transformer feeds a 4-wire, 3-phase 208/120-volt circuit breaker panel board which, in turn, controls the incandescent R-52 bulb lamps. Each twin incandescent fixture is on a separate switch. Three single incandescent fixtures are on a second switch. Each plug-in circuit, of which there are four in a section, is separately controlled by a circuit breaker on the panel.

Each group of 8 3,000-watt mercury lamps is controlled by a circuit-breaker protected magnetic switch.

The machine shop between the two high bay areas, comprising 52,900 sq ft, is lighted by eight continuous rows of two-lamp, 96-in. porcelain enameled fixtures. Here again, about 10 per cent of the light is directed upward, as shown in Fig. 2. The average illumination here is 35 footcandles.



Fig. 3—Original lighting in use where steam locomotive repairs were handled. This is the same section which is shown relighted in Fig. 1.



Fig. 4—The electric traction motor repair section is lighted with a combination of alternate 400-watt mercury and 750-watt single R-52 lamps in medium high bay reflectors.

This section is divided into eight approximately equal sections. The source of current for each section is brought through a circuit breaker to a 480/208/120-volt dry type transformer. The 208/120-volt, 4-wire, 3-phase power is controlled by a circuit breaker type panel board where each lamp circuit is protected and switched to a breaker

on the panel. In general, a circuit consists of 8 lamps, or a total of sixteen 96-in. T-12 fluorescent lamps.

The traction motor and generator repair shop was formerly the wood mill. This shop, shown in Fig. 4, is about 70 ft wide and 300 ft long, making a total area of about 21,000 sq ft.

Fig. 5—The diesel-electric parts storehouse. General lighting is provided by a combination of 400-watt mercury and 750-watt incandescent lamps in medium high bay reflectors. Supplementary lighting for the material shelves and cases is accomplished by the use of continuous rows of 40-watt fluorescent lamps in porcelain enameled reflectors between rows of cases and placed slightly above the cases.



The lighting consists of a combination of 750-watt, R-52 lamps, in Alzak medium low bay reflectors mounted approximately 20 ft above the floor. Four-hundred-watt mercury lamps installed in the same type of reflector are used alternately, and spaced 13 ft 4 in. in the row, with about 14 ft between rows. Approximately 35 footcandles illumination is provided.

Each lighting circuit consists of one incandescent R-52 lamp and one mercury unit, and is controlled from a breaker located on the lighting panel.

The diesel parts storehouse (Fig. 5), which was originally the tank shop, and used for making all types of repairs on steam locomotive tanks, is 150 ft wide and 500 ft long. It has a depressed loading track along one side of the building for loading and unloading cars.

The lighting power is obtained from a 225 kva unit substation located in the middle of the floor area. Incoming voltage is 2,400, and the distribution is 120/208-volt, 4-wire, 3-phase power. The general lighting consists of a combination of 750-watt incandescent lamps, alternated with 400-watt mercury vapor lamps in medium high bay reflectors. The lighting of the material cases is supplemented by use of a continuous fluorescent light strip using single 40-watt fluorescent lamps in a symmetrical reflector.

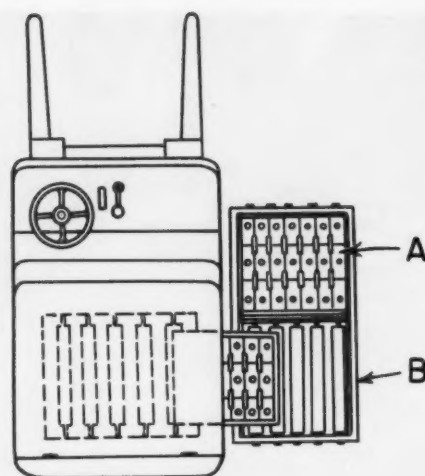
To assist in loading and unloading cars, and to provide light for their interior, the pull-down type of fixture is used, which can be moved on a Trol-E-Duct parallel to the track. By pulling it down by means of a rope, it can be hooked on the underside of the car door.

The maintenance or relamping through the high bay areas mentioned at the beginning, is carried out from the overhead cranes. In the low bay machine shop area, ladders are used to maintain the 96-in. fluorescent lamp system.

In the electric traction motor shop area, the lamps are replaced from the floor by means of a lamp changer. This is also true in the case of the diesel parts storehouse.

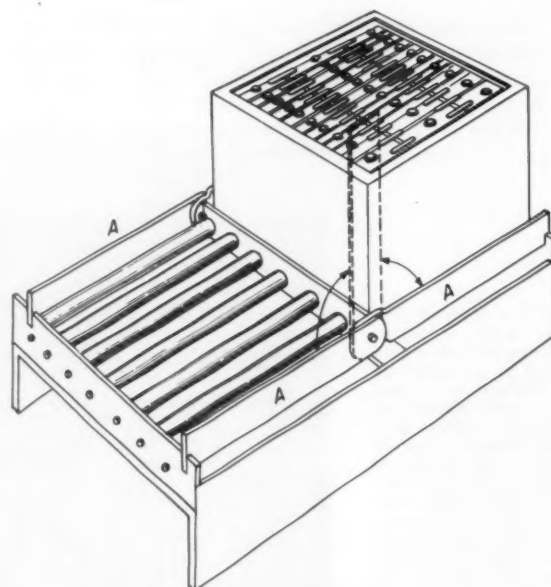
The Battery Goes to the Truck

A midwestern manufacturer has developed a method of bringing charged batteries to the lift-truck instead of having the lift-truck travel to the central charging room. As reported by field engineers of Gould-National Batteries, Inc., two special steel skids (Fig. 1) with a bed of rollers mounted in anti-friction bearings were designed and built large enough to hold two batteries. A charged battery is placed on one half of the skid and transported either by powerized hand truck or fork-lift from the central charging room to the equipment which needs a charged battery. The battery compartments of the trucks are also fitted with anti-friction rollers. The skid is placed alongside the truck at the same elevation as the battery compartment. One side of the compartment is removed and the discharged battery is pushed out onto the vacant half of the skid (Fig. 2). The skid is moved a few feet and the charged battery is pushed into the compartment. The hand truck returns the skid with the discharged battery to the charging room. The entire operation at the truck is completed in less than five minutes.

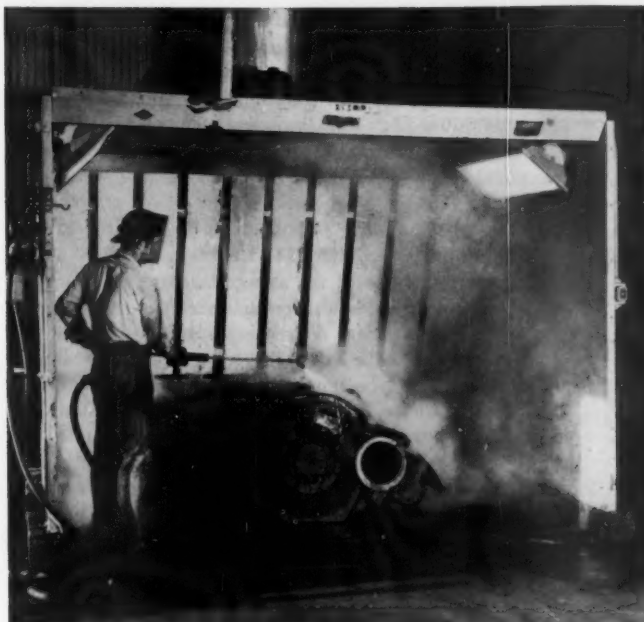


The special battery dolly or platform is placed in position alongside fork-lift truck by either powerized hand platform truck or fork-lift, leveled even with the bottom of the battery compartment of truck being serviced. Discharged battery (B) is pushed out onto the vacant section of platform. The platform is moved up into position so that the charged battery (A) can be pushed into the battery compartment of the truck. The entire battery changing operation takes less than five minutes.

Calls for charged batteries are placed by telephone to the central charging room by the truck operator who knows from experience when his equipment begins to lose its acceleration and pep. The battery room attendant when delivering charged batteries also checks the specific gravity of all batteries in service to determine when a truck needs a fully charged battery. There is no set schedule for charging batteries.



The platform is of steel with end openings $9\frac{1}{2}$ in. from the floor to permit handling either by fork-lift or powerized hand platform truck. Steel bars (A) are pivoted at the center and fit into notches in the platform at each end. Bars prevent batteries from rolling off the platform. When raised to the position indicated by the dotted lines, the battery can easily be rolled off or on.



Left: A number of railroads consider the steam jenny to be an essential shop facility. Right: A soft abrasive blast is considered an excellent method of removing foreign material and preparing surfaces for receiving new varnish.

An Electrical Section Report . . .

When and Where To Use What Cleaning Method

Electrical men tell what they think of different types of cleaning agents and offer suggestions on how to use and handle them

A STUDY OF CLEANING METHODS and cleaning agents for electrical and mechanical parts has been made by the Electrical Section, Association of American Railroads, and results of the study appear as a part of the report of the Committee on Repair Shops. It was prepared by a subcommittee of which J. O. Fraker, superintendent diesel and electrical maintenance, Texas & Pacific, is chairman. The substance of the section of the report on cleaning follows

Vapor Degreaser

A comparatively new development for cleaning oil and oil laden dirt from electrical equipment, which has found wide acceptance in the last several years, is the vapor degreaser. The use of this method of cleaning motors and generators used in diesel locomotives has been a very controversial issue, and it was felt that the committee should make a thorough investigation of the subject, and furnish information which would be beneficial to all concerned.

The most generally accepted advantages, controversial

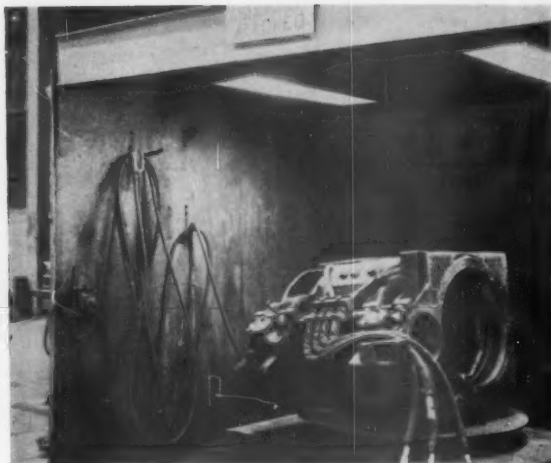
factors and disadvantages of the vapor degreaser may be listed as follows:

Advantages

1. Reaches voids and inaccessible areas in electrical equipment not reached by other means of cleaning.
2. Ideal for removal of moisture and clearing moisture grounds.
3. Excellent means of stripping surplus varnish prior to re-impregnation and for cleaning subsequent to re-winding or cleaning after old coils are removed.
4. Fast and simple to use.
5. Minimum labor required.
6. Permits batch type cleaning.

Controversial Factors and Disadvantages

1. Will attack certain varnishes, shellacs and enamels, but this is minimized if the parts are handled under controlled conditions.
2. Does not permit cleaning equipment in place.
3. Will remove paint.



Spray solvents, the most widely established form of cleaning agent, must be suitable for application by jet spray, wiping or immersion, and require no rinsing, flushing or special removal except an airstream.

4. Vapors are toxic requiring ample ventilation.

In surveying this method of cleaning with several railroads, electrical equipment manufacturers and outside repair shops that use, or have knowledge of, the vapor degreaser, it was the general consensus of the opinion that the immersion time should be controlled and regulated at all times where the primary objective is to clean and not to remove the varnish. Most present day, or newly developed varnishes, are not nearly as susceptible to being dissolved by the degreaser solvents as are older varnishes. The newer varnishes permit a greater line of demarcation between controlled cleaning and varnish removal.

When cleaning in a vapor degreaser, the parts being cleaned should be limited to disassembled machines at general overhaul. The commutator end of an armature should be up and, insofar as possible, away from direct contact with the solvents. This would be desired in that some manufacturers of electrical equipment feel that the solvents could have some effect on the commutator structure after repeated use of the degreaser. This concern has never been actually substantiated in the field. The theory of "hot spots" occurring in the laminations, as caused by the use of the degreaser, has been discussed and considered by the committee. It was not found possible to develop proof of degreasers causing this condition, and more information is being sought.

After cleaning in the vapor degreaser, the apparatus should be further cleaned with a soft abrasive blast to remove loose pieces of varnish, insulating enamels, carbons, scale, etc., to insure a smooth bright surface for adhesion of new varnish or insulating enamels. If the apparatus is to receive new varnish, it should be pressure impregnated and baked, (either in an oven or with lamps), followed by two dips and bakes in a suitable grade of insulating varnish. Where facilities for impregnation are not available, three dips and bakes should be given.

The study of the vapor degreaser and correlation of the experiences gained in its use indicate that the disadvantages of this method of cleaning are not nearly the detriment that they were first thought to be. As all elec-

trical men know, the basis of any electrical maintenance is cleanliness, and any devices, processes or equipment that are used in connection with this type of work must have some intelligent regulation covering their usage. The committee feels that the advantages at present favor the degreaser process as a productive tool for heavy electrical repair work.

Selection of Vapor Degreaser Solvents

The increased use of the vapor degreaser as a means of cleaning electrical equipment has accordingly increased the needs for an ideal degreasing solvent. For the degreasing system to be safe, effective and economical, the solvent used must be non-inflammable and of comparatively low toxicity, have high vapor density, good stability, and be of moderate cost. At present, only trichlorethylene and perchlorethylene (tetrachlorethylene) meet all these requirements. Either of these solvents should contain inhibitors, or stabilizers to resist the formation of acids that are sometimes encountered in the degreasing and vapor drying of metal parts.

Pound for pound, it takes approximately two per cent more heat in Btu to boil trichlorethylene than to boil perchlorethylene. However, the pound of trichlorethylene vapor can heat almost eight pounds of steel to vapor temperature, whereas the pound of perchlorethylene vapor can bring about only four and one-half pounds of steel to the corresponding higher temperature level. For this reason, a degreaser operating on trichlorethylene will have a higher capacity than a similar unit of perchlorethylene. Also, it takes about one-third fewer Btu to heat work to vapor temperature with trichlorethylene than with perchlorethylene, which results in less steam consumption in favor of trichlorethylene. The boiling point of trichlorethylene is 188 deg F and that of perchlorethylene is 250 deg F.

Because of lower boiling point of trichlorethylene, steam heating demands for degreasing operations can be handled with steam at approximately 15 psi, while those using perchlorethylene require steam at approximately 60 lb. The same reasoning applies to the operation of recovery distillation equipment, where the separation of solvent from oil mixtures must be accomplished by both indirect steam heating and be steam distillation. Normally trichlorethylene, can be used in a degreaser manufactured for the use of perchlorethylene, but perchlorethylene cannot be used in a degreaser designed specifically for the use of trichlorethylene.

Most degreasers are made to use steam as the heating medium, although electric and gas heated units are also in service. Gas units are not so desirable because of the fact that the pilot lights can be extinguished by the solvent vapors; especially degreasers that are installed in a pit.

The lower temperature of cleaned parts coming from a trichlorethylene degreaser is an advantage reflected in the easier handling of work. There are operations where the higher boiling temperature of perchlorethylene can serve to advantage, for example, the removal of high melting waxes, certain water-bearing contaminants, and the penetration of spot-welded seams or fine orifices.

Exhaustive tests conducted over extended periods of time have shown that, in equivalent water-cooled manual degreasers, solvent losses by diffusion into the working

atmosphere may be slightly higher with perchlorethylene than with trichlorethylene, due to more positive up-drafts along the walls of the warmer degreaser. On conveyor type degreasers, solvent losses are about equal unless the nature of the work involves some dragout, in which case the perchlorethylene losses may be considerably higher, due to its 11 per cent higher specific gravity.

From the general standpoint of production, demand and operating economy, the use of trichlorethylene affords maximum capacity in the water-cooled units needed to handle high work volumes in cleaning most pieces of electrical equipment.

Solvents Cleaner For Electrical Parts

The purpose of this specification is to establish general data covering an ideal liquid solvent-type cleaner suitable for bucket type, wipe and spray cleaning of generators, motors, electrical cabinets and other pieces of electrical apparatus used in diesel locomotives and passenger cars.

This ideal cleaner should meet the following general requirements:

1. It should completely and rapidly flush away the oil, grease, dust, gum, carbon dust and lint which impair electrical characteristics and which are ordinarily found in heavy-duty electrical machinery. The solvent must be suitable for application by jet spray, wiping or immersion. No special rinsing, flushing or special removal methods shall be required, except the use of an air blast to facilitate drying. The solvent, when dry, shall leave no inherent residue.

2. The solvent shall not corrode, pit or damage copper, steel, iron, brass, bronze, sintered bearings, babbitt, solder, silver solder, zinc, silver, aluminum, or magnesium after 72 hours immersion at normal room temperature of 70 deg. F.

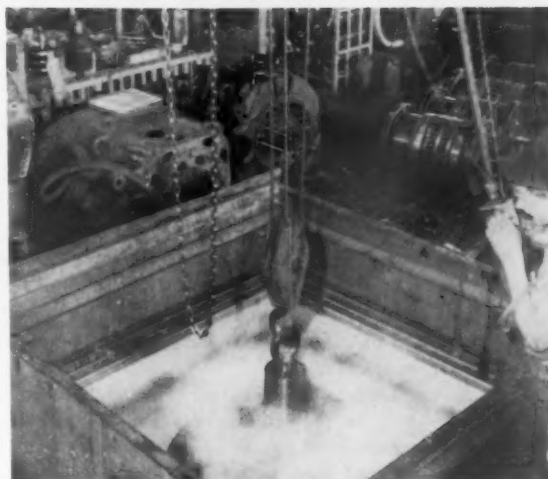
3. The material, when applied in the normal manner of cleaning, shall not damage or reduce the electrical insulating value of glyptal varnish, phenolic varnish, mica, rubber, varnished cambric, sealing compounds, silicon, Teflon (Polyethylenefluoride) shellac, or other insulating materials.

4. The cleaner shall contain no material which will produce chronic toxic effects due to the inhalation of low concentrations of vapor over long periods of time. Specifically, the cleaner shall contain no carbon tetrachloride.

5. The cleaner shall have a relative evaporation rate of not more than 1.5, or 50 per cent more as compared to carbon-tetrachloride when 15 cc of materials are force air dried.

6. The cleaner shall have an initial flash point (Cleveland open cup) of over 200 deg F and after 90 per cent has been evaporated, the flash point must be over 110 deg F. The solvent should offer no fire hazard during the period while the solvent is being applied to the equipment being cleaned, and the fire danger should be negligible during the evaporation of the solvent when normal safety precautions are observed.

Solvent cleaners produced to conform to the above general requirements should also be subject to practical shop trial, in addition to laboratory test, before the material in question is approved as satisfactory in all respects.



The vapor degreaser is finding increasing favor in railroad shops. The report recommends the degreasing of armatures with the commutator end up and above the vapor.

Mechanical Parts Cleaners

The purpose of the following specifications is to establish general requirements for ideal mechanical parts cleaners for the applications as indicated. These specifications are offered as a guide for selecting cleaning materials as may be required. There are many items not covered in this report, such as diesel engine interior cleaners, steam generator coil cleaners, brush holder cleaners, etc., that will be included in future assignments.

1. HEAVY DUTY HOT TANK CLEANER: Type: Caustic (powder)

Purpose: For heavy duty cleaning of ferrous metal parts in hot tanks and air filters, either in hot tanks or in filter machinery.

Requirements: (a) Granular, free flowing alkaline cleaner or uniform composition and quality, be readily soluble in hot water and essentially dust free.

(b) Solution of cleaner at normal concentration in use, of 4 to 6 oz. per gal, must have a pH of not less than 13.0.

(c) Solution of cleaner at normal working concentrations of 4 to 6 oz. per gal, must exhibit good stability over a reasonable period of time, must clean normal soils at minimum temperature of 180 deg F in a reasonable time, and provide free rinsing in either a spray or water bath rinse.

2. MILD ALKALINE CLEANER: Type: Alkaline (powder)

Purpose: For cleaning exterior and interior painted surfaces of locomotives and cars.

Requirements: (a) Must be readily soluble in cold water (60 deg F).

(b) Working solution of 3 per cent per gal shall have maximum pH of 9.5.

(c) Cleaner must be capable of cleaning oily soil without streaking or staining painted or enamel surfaces and must rinse free without residue.

(d) Material must not be corrosive and must not cause loss of gloss or change in color of painted or enamel surfaces.

3. MILD ACID CLEANER: Type: Acid (powder)

Purpose: For cleaning exterior painted surfaces of locomotives and cars.

Requirements: (a) pH of 3 per cent solution, 1.2 to 1.5.

(b) Capable of cleaning road-bed dirt, brake shoe dust and non-oily soil without damaging paints or enamels.

(c) Rinse freely by water spray without streaking.

(d) Reduce corrosion of bare metal to minimum.

(e) Maintain clean surfaces without film deposition after repeated application.

4. SOLVENT TYPE CLEANER: Type: Solvent (liquid)

Purpose: For cleaning interior of engine rooms, underframes and trucks on diesel locomotives.

Requirements: (a) Form stable emulsion with water.

(b) Capable of dilution with kerosene or diesel fuel oil without separation.

(c) Material shall be capable of cleaning bare metal surfaces as well as painted surfaces which have been soiled with the contaminants in railroad service, including oil, grease, road dust, carbonized deposits, tarry deposits, etc.

(d) Material must be non-corrosive to metals, and non-injurious to paints or enamels.

(e) Rinse freely with water spray without streaking.

(f) Minimum flash point of 180 deg F, open cup.

(g) Shall not contain phenols or cresols.

Materials offered to meet the requirements of the above specifications for mechanical parts cleaners should also be subject to laboratory tests and to practical trial in a shop, for the purposes intended in order to determine whether they meet the requirements in all respects.

Disposal of Waste Cleaning Materials

Legal control of stream pollution is now under way and will generally govern waste disposal from railway and other industrial property. In one way or another, most states have laws stating that wastes must be kept out of public waters if they contain materials which may be harmful to the public health, deleterious to fish and other aquatic life, or if they would render the water otherwise unfit for its normal domestic, industrial or recreational uses.

The disposal of waste cleaning material should be given ample consideration when selecting cleaners and locating cleaning facilities. Minimum treatment required for the waste material depends upon its type and volume, its effect on the normal use of the stream receiving it, and the particular local, state or federal regulating laws governing.

Naptha Not Recommended

In the report submitted by the committee in 1953, mention was made of the use of cleaning naphthas for cleaning electrical equipment. At the annual meeting of the Fire Protection and Insurance Section, of the Association of American Railroads, conducted at St. Louis, Mo., in October 1953, a recommendation was made that naphtha not be used as a cleaning medium, because of its inflammability.

It is therefore the wish of the committee to delete all references to the use of naphtha in the 1953 report as a recommended method of cleaning electrical equipment.

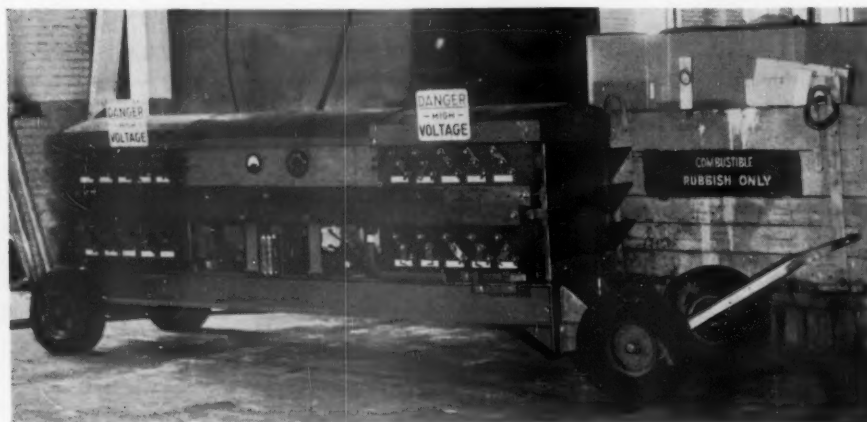
Load Tester on Wheels

A portable load tester for diesel locomotive engines and generators made from a discarded dynamic braking resistor, complete with its blower, serves the needs of the Milwaukee shops in Milwaukee, Wis. Ventilating air is drawn in at the bottom and passes over the grids and out at the ends. Since there are no restrictions to air flow, the ventilation is sufficient to allow the testing of all engines up to 2,000 hp.

Adjustable copper jumpers are used for arranging the

grid connections to suit the load requirements. The resistor is mounted on a war surplus bomb wagon with rubber tires. It can be moved to any point in the shop or yard and is normally towed to the locomotive with an industrial truck.

It can be moved by three men if necessary. It is used for testing the output of engine-generator sets and for run-in tests. A voltmeter and an ammeter on the panel indicate the load on the generator.



Rubber tires and a low center of gravity make it safely portable.

Diesel Enemy No. 2



By Gordon Taylor

A recent diesel note named *Dirt* as Diesel Enemy No. 1. Another enemy to first-class diesel maintenance is *Carelessness*, which I list as Enemy No. 2.

Carelessness is a close pal of dirt, because he permits dirt to get into so many spots where the latter can cause trouble. Carelessness not only aids dirt, but causes many other troubles. Here are some of the cases in which Enemy No. 2 has caused trouble:

1. Failure to spread a cotter key in the governor and fuel linkage caused the key to drop out, permitting the engine to start running away with no overspeed control. Fortunately the governor fly balls caught the fuel control wire, causing it to wind up and shut down the engine. A narrow escape from a wrecked diesel engine.

2. There have been two or three cases where the equalizing cables have not been firmly attached to brush holders on traction motors, causing flashovers.

3. At a diesel fuel station, the plug had not been replaced when the fuel hose was disconnected from the locomotive fuel tank. When I saw the diesel unit being moved through the washing machine, a short time later, water was being sprayed through the open fuel filler opening into the fuel tank. As you know, water in the fuel will stick and bind the fuel injector plunger and rack. A fuel injector unit for an E.M.D. engine costs \$98.50.

4. In a certain diesel shop, I recently saw several diesel injector units lying on a piece of very dirty paper on the shop floor. There was nothing to protect the nozzle tips or the injector unit rack. Later, I saw several more

injector nozzles lying in a heap on the floor without the benefit of even a piece of card board or paper. This sort of thing is inexcusable. Carrying trays have been provided for injector units that are out of the engine and cone covers are provided for the protection of nozzle tips. These must be used.

5. *Carelessness* permitted some employee to place an Alco car body filter into its frame with only one spring retainer to hold it. The lug at the top of the frame had broken off, and there was no way to fasten one of the retainers. *Carelessness* was hanging around and must have said, "Let it go, I think it will be all right." What do you think happened? A fireman happened to pass the loose filter at the precise moment that it fell out of its frame, and he received a bad scalp wound.

6. *Carelessness* caused a fireman to open a high-voltage cabinet and tamper with the power contactors, with the engine and generator still on the line. His careless or forgetful attitude earned him a pair of burned hands, and he was fortunate to not suffer worse injury. He had never heard that "The wife of a careless man is almost a widow."

7. A mechanic dropped a bolt or screw into an electric generator while fastening some metal work in the engine room. He did nothing to locate the fallen part, nor did he notify the electrical foreman to closely examine the generator. When the engine was being barred over, preparatory to starting it, the bolt or screw was caught between the brushes, and a long gash was dug into the commutator. It took a great deal of extra work to make the generator fit for service. The commutator still bears a bad scar that has to be closely watched to see that it causes no further trouble. The carelessness in this case was not so much in dropping the bolt as it was in the failure to locate it after it was dropped.

8. At a certain repair point, the maintainers were notified that lube oil samples showed that oil was gummy and dirty, which indicated blow-by. It was suggested that there must be some broken piston rings. An inspection of some kind was made, but no blow-by tests were made. The engine was dispatched without any cause being found for dirty oil. Before the engine operated 400 miles, it was pounding badly and it had to be tied up at an outlying point for repairs. There it was found that one piston had practically no rings at all. *Carelessness* had been on the job and caused a lot of needless expense.

9. This one is really several cases. Due to carelessness in draining steam generators on GP-7 units in cold weather, there have been several cases where the generators have been frozen, causing delays and needless expense.

10. There have been several cases where motors and generators have flashed over, due to the dirty condition of the units. Every one, by this time, should know that dirty creepage surfaces on motors and generators simply set the stage for flashovers. So when Diesel Enemies No. 1 and No. 2, *Dirt* and *Carelessness*, get on the job, together, you may expect fireworks that will provide plenty of hot work and needless expense.

11. Recently, I found a considerable quantity of motor brushes that had been removed before they needed to be discarded. Today, my attention was drawn to a case where a flashover had occurred, presumably due to using brushes that were too short. This is an example of carelessness working in directly opposite directions. It shows that judgment must be used to see that brushes are not thrown away where they still have service life,—and that brushes must be thrown away when they reach the stage where their continued use would cause trouble.

12. An Alco diesel unit was sent into the shop with a scored crank shaft. If this unit had been given the prescribed crankcase inspection to check the condition of the oil screen, I feel certain that the failure would have been prevented.

13. This is really a collection of cases. It covers the cases where engines are worked without covering the oil lines, fuel lines, and water lines to keep dirt and foreign particles out of the interior of the engine. A recent case of low lube pressure in an air compressor was due to a bit of wood beneath a check valve. This is a case where dirt and carelessness working together,—

and they are great pals,—can cause no end of trouble.

14. There have been several cases recently where air compressors have drive coupling knocks. The trouble seems to be lack of lubricant, and carelessness appears to be the reason for the lack of the lubricant. Summary:

I could continue to enumerate instances of carelessness creating diesel troubles, but you have heard enough to know that it is second only to dirt in causing troubles. Dirt is rated first because it is present everywhere. Carelessness is rated second because it is not present everywhere, thank goodness.

Carelessness is an attitude that depends on a man's willingness to make it a part of his way of life. If our supervisors and maintainers will adopt a positive attitude of carefulness, instead of a negative attitude of carelessness, they can, at one stroke, make a success of diesel maintenance.

Just as there is no room for dirt in a diesel engine, so there is no room for a careless maintainer or foreman in a successful diesel organization. If you banish *dirt* and carelessness, you will find that your maintenance allowance will reach much further.

Fuse Maintenance Prevents Failures

By David H. Noble

Fuses in electrical circuits are like the safety valves on a steam boiler. When operating correctly, they can prevent extensive damage, but when they blow unnecessarily, it's time to tighten up on your electrical maintenance.

Simple and dependable as they are, fuses require a certain amount of care. No electrical supervisor will ever argue over a fuse that blows when there's a fault in the circuit. But a fuse which blows because it wasn't applied properly or because it was the wrong size is another story. That fuse is no longer the hero that saved the circuit; it's the villain that caused the failure.

Fuses are intentional weak links in an electrical circuit, installed so that they will open the supply line when too much current flows. Current flowing through a wire must overcome a retarding force very similar to friction. This force is known as the resistance of the circuit and the effort required to overcome it causes heat, just as friction does, the amount of heat increasing rapidly as the current increases.

That heat is what makes a fuse operate. A fuse is simply a link of metal with a low melting point which is inserted in the circuit. When the current is below the fuse rating, there is not enough heat to melt the fuse, but as the current increases, the heat increases even more. As a matter of fact, the heat increases as the square of the current. That is, if the current is doubled, the heat is four times as great; if the current increases four times, there is sixteen times as much heat.

When the current rises above the fuse rating, enough heat is generated to melt the link, and the circuit is opened before any damage can be done. If a short circuit occurs, the current rises so fast, and the heat increases so quickly, that the fuse literally blows apart.

Heat, therefore, is a natural enemy of fuse operation. Anything that tends to create excess heat will affect the rating of the fuse.

Among other things, loose connections will cause heat. Bolts or nuts holding fuse links in place should be tightened firmly with a wrench or a pair of pliers, and on large fuses, fuse clips should be clamped tight with any of the patented clamp-lock devices available. Inspect fuses regularly for signs of unusual heat, and if any are found, check all connections closely. Pitted or burned ferules or blades on the fuse indicate poor contact pressure in the fuse clips. A scorched casing or spacer bar generally indicates a loose connection between the link and holder, blade and clip, or feeder and terminal.

Even tight connections may not be the complete answer. Dirt and grease will raise contact resistance and cause heating, so it's important to keep contact surfaces clean. Use fine sandpaper or a piece of heavy canvas to polish clips blades, and links; but avoid coarse sandpaper which might leave grit that would keep the surface apart and cause more trouble.

When currents are high, brass or copper washers should be placed between fuse links and mounting bolts. This will increase contact area, eliminate localized heating, and prevent mechanical damage to the fuse while the mounting bolt is being tightened.

Fuses are weak mechanically, so handle links carefully. Too much bending and twisting will set up cracks which tend to encourage premature failure. And never install a fuse so it is under strain; such a fuse has two strikes against it.

Observe the three basic rules of fuse maintenance, and they'll give little trouble. Just remember to (1) Keep 'em tight; (2) Keep 'em bright; and (3) Install 'em right!

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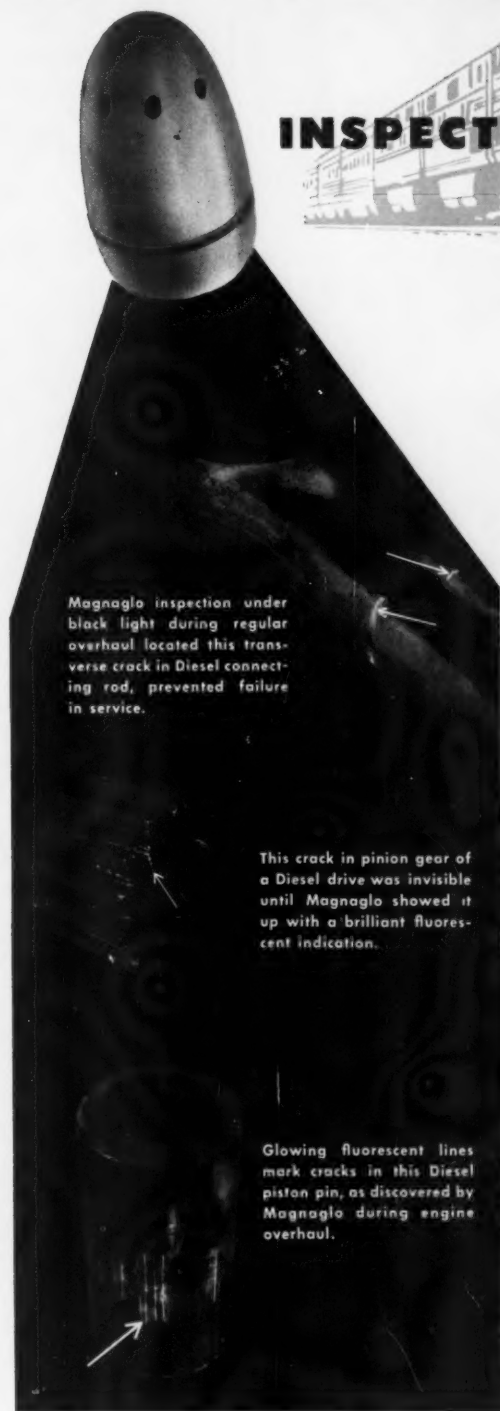
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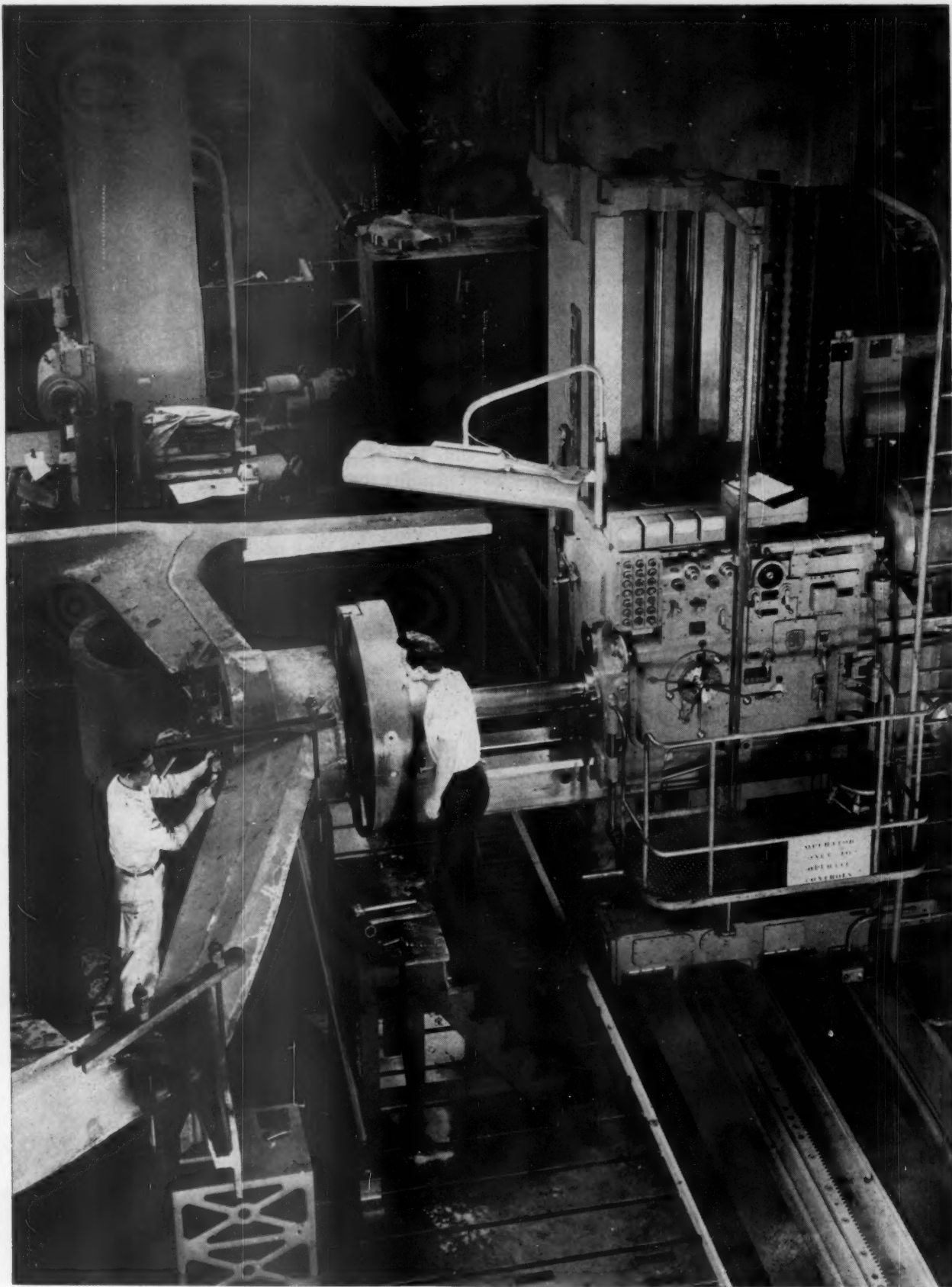
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Magnaglo inspection under black light during regular overhaul located this transverse crack in Diesel connecting rod, prevented failure in service.

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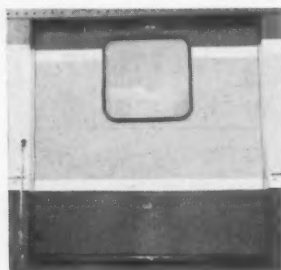
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Photo courtesy of National Supply Co., Torrance, Calif., shows 50 Series Floor type machine boring and facing the stern propeller shaft housing in the skeg casting for an ocean-going freighter.

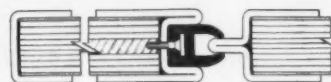
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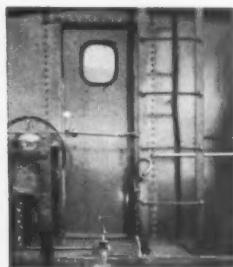
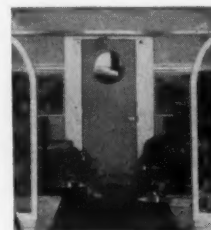


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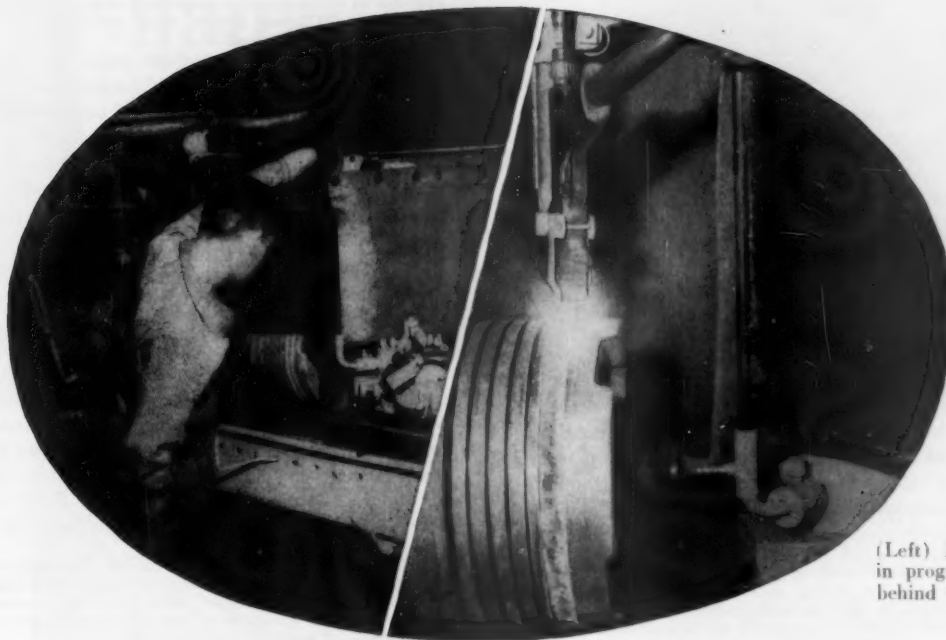


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Questions and Answers

Interchange Rules

This is the tenth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

111-Q—Where it is impractical for either or both roads to employ inspectors at an interchange point, may other arrangements be made for handling car interchange matters?

A—Where either or both roads at an interchange point do not employ inspectors to inspect cars received in interchange, a special agreement may be made between such roads to designate the next inspection terminal on either or both roads beyond such station as the point, or points, where interchange inspection will be made and protection furnished for cardable car defects and for loaded cars requiring transfer or adjustment of a lading.

112-Q—In view of the answer to Question No. 111, would it also be proper for two or more roads to enter into an agreement whereby cars with cardable defects or transferable defects would be accepted in interchange on the basis of records only covering such defects, with the understanding that the delivering line would furnish protection in the event exceptions were later taken by another road when cars in question next moved through interchange?

A—No. After cars with cardable defects or transferable defects leave the designated point of interchange, it is not intended that claims for protection shall be filed with the delivery road involved. (See Interpretation 4, Rule 2.)

113-Q—May two or more roads enter into an agreement which stipulates that an average charge (flat rate) shall be used for the expense of transferring lading from defective cars or adjusting of shifted lading on cars, regardless of actual cost, where interchange is involved?

A—Yes.

114-Q—Where wheels are removed and journal is found to have evidence of overheating and is also rusted and pitted, is car owner or handling line responsible for cost of repairs?

A—Such combination of defects is considered to be the responsibility of the handling line.

115-Q—Where wheels are changed in foreign cars in interchange service having grease lubricated journal roller bearings, what kind of lubricant should be used in replacing the roller bearing units involved?

A—One of the A.A.R. approved greases listed in Section (k) of Rule 66 should be used.

116-Q—When decision is made to retire cars account obsolescence, badly deteriorated or wrecked, what kind of inspection should first be made before dismantling?

A—A careful inspection should promptly be made for defect cards which may be attached to the underframe details of such cars. Where found, such cards should be

removed and billing repair cards prepared versus issuing roads under the terms of Rule 94.

117-Q—Where Bad Order Return Card of the form shown in the lower half of page 298 of the 1954 Code is applied to a foreign car requiring repairs by owner, will this action of itself insure that such car will actually move home for repairs?

A—No, this is only a part of the action required in such cases. The defective car should be held and the department on the railroad in charge of car service and car distribution should be immediately notified so that such routing as may exist can be cancelled and new billing prepared covering movement to home road, or in the case of private line cars, to the repair shop designated by the car owner.

118-Q—In view of the notes following Items 46 and 47 of Rule 101, what charge may be rendered on authority of defect card where portions of AB valves have been damaged by fire to the extent that they are beyond reconditioning?

A—The notes following Items 46 and 47 of Rule 101 are intended to cover the average cost of AB valve portions which are actually sent to the air brake manufacturers for reconditioning. However, in cases where it can be predetermined that such AB valve portions are damaged beyond repair, charge on authority of the defect card may be made for the full value of new material.

119-Q—Would charge for one-half of the allowance for repacking be permissible where derailed car is sent to the repair track and journal box packing removed for examination of wheels and journals when repacking date is between 12 and 17 months old?

A—Paragraph (g-2) of Rule 66 does not apply in cases where journal box packing is removed from journal boxes for inspection purposes only, no repair work being involved.

120-Q—What action should be taken by repairing road where car owner takes exception to a bill rendered for coupler knuckle account missing?

A—Unless the handling line admits that knuckle in question was arbitrarily taken from the car for other purposes, the car owner is responsible for missing knuckle, in accordance with Rule 43.

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G50-Q—Describe the movement of transition lever in manual operation.

A—If any unit of a multiple unit consist has to be controlled manually the locomotive must be started with transition lever in the No. 1 position. The lever is then advanced to the second, third and fourth

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Questions and Answers

positions consecutively as the locomotive speed increases. Transition lever must be returned in the same manner as the speed decreases.

G51-Q—What control does the throttle position have over transition lever movement?

Manual 2310—page 107

A—Manual transition from Position 2 to 3 or 3 to 2 cannot be made unless the throttle is placed in RUN 6 or lower.

G52-Q—What does transition lever movement have to do with dynamic braking (if locomotive is so equipped)?

A—Moving transition lever to OFF partially establishes the braking circuit. Moving the lever to B position completes the braking circuit. Moving the lever farther to the right B increases the braking effort.

Instrument Panel Air gauges

Manual 2310—page 108

G53-Q—What pressures are indicated by the air gauges?

A—One duplex gauge indicates Main reservoir and equalizing reservoir. Another gauge shows brake pipe and brake cylinder pressures. Another gauge is used for application pipe pressure and if it is a duplex, it may indicate suppression pressure. Other gauges are used as required, depending on the installation.

Load Indicating Meter

G54-Q—What is the function of the load indicating meter?

A—This meter is an accurate guide to the load and pulling force of the locomotive.

G55-Q—How is the load indicating meter connected?

A—Into the leads of the No. 4 motor.

G56-Q—How can the meter show the current each motor receives?

A—Since the amperage is the same in all motors, the amount of current shown on the meter indicates the amount each motor receives.

G57-Q—How is the meter dial marked?

A—The dial of the meter is graduated into amperes from 0 at the left to 1500 at the extreme right.

G58-Q—What is the purpose of the name plate, mounted below the load meter dial?

A—To show the time it is permissible to operate at different stages of overload.

G59-Q—Are these ratings accumulative?

A—These short time overload ratings are accumulative, which means that it is permissible to operate the full time of each rating consecutively or in any combination.

Manual 2310—page 109

G60-Q—What else does the name plate show?

A—The maximum amount of amperage permissible to use when operating the dynamic brake.

Wheel Slip Light

G61-Q—What is the purpose of the wheel slip light?

A—Flashing of the wheel slip light indicates that a pair of more of wheels are slipping.

G62-Q—What must be done in case the wheel slip light flashes repeatedly?

A—Throttle should be reduced, sand applied as needed, and when rail conditions improve return throttle to its original position.

Dynamic Brake Warning Light

G63-Q—What is the purpose of the dynamic brake warning light?

A—To indicate that the dynamic brake in any of the units is overloaded.

G64-Q—When the light is lit, what must be done?

A—The brake should be reduced.

Switches

G65-Q—What does the control push button switch box contain?

A—Switches for control, light and accessory circuits. Name plates for each switch are illuminated by lights contained in the box.

G66-Q—What controls these lights?

A—These lights are operated by the gauge light switch.

G67-Q—Where is the distribution panel and what does it contain?

A—Located on the right side of the electrical control cabinet in the engine room, it has a number of main switches, all of which are to be closed during normal operation.

P.C. Switch

Manual 2310—page 110

G68-Q—How does the Pneumatic Control (PC) switch function?

A—The pneumatic control switch (often referred to as the power cut-off switch) is an air-operated electric switch that is tripped by any penalty air application, automatically shutting off the power output of the locomotive.

G69-Q—What action takes place when this switch is tripped?

A—The ER relay is de-energized, reducing the engines to idle speed and shuts off all fuel pumps.

G70-Q—Do the engines sometimes stop when the PC switch is tripped?

A—Yes, if the throttle is left in the 5th or 6th notch when the switch is tripped, the engines will stop.

G71-Q—Is there any indication in the cab to warn the engineman that the PC switch has been tripped?

A—Yes, a white indicating (PCS) light in the cab will light when the switch is tripped.

G72-Q—What must be done to reset the PC switch?

A—If the throttle is returned to IDLE, and control

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Questions and Answers

of the brake is recovered, the switch resets itself automatically. When this happens the indicating light will go out.

G73-Q—Where is this switch located and when is it used?

A—The unit selector switch is located adjacent to the engineer's instrument panel and is supplied on locomotives equipped with dynamic braking.

G74-Q—How many positions has this switch?

A—The unit selector switch has four positions: 1, 2, 3, 4 and should be set to correspond with the number of units in the locomotive.

G75-Q—When should the switch be set?

A—Before leaving the terminal.

G76-Q—After setting, should the switch position be altered?

A—The unit selector switch must not be changed even if the engine is isolated enroute. The only time the switch is changed is when the locomotive consist is changed.

(Manual 2310—page 408)

G77-Q—In addition to air brakes and sanders, what is compressed air used for?

A—The reverser, power contactors, shutter operating cylinders, horn, bell and windshield wipers.

(Manual 2310—page 110)

G78-Q—What type of air brake is used on these locomotives?

A—The 24-RL brake equipment.

(Manual 2310—page 111)

G79-Q—What does the cab air brake equipment consist of?

A—The automatic and independent brake valve and the K-2a Rotair valve and they are located to the right of the controller.

G80-Q—What are the positions of the automatic brake valve and what kind of a handle is used?

A—Six positions: RELEASE, RUNNING, FIRST SERVICE, LAP, SERVICE and EMERGENCY. The handle may be of the rigid or hinged type depending on the requirements.

G81-Q—In what position is the handle removable, and when should it be removed?

A—RUNNING position. The handle should be removed when a double cab locomotive is being operation on a dead engine when being hauled in a d from the opposite end. (Some railroads require freight car.)

G82-Q—What is the purpose of the hinged handle (when used)?

A—The hinged handle is used to suppress a safety control application by depressing it to a horizontal position. On some railroads a sanding bail provides sanding by further depressing the brake valve handle.

G83-Q—What other items does the automatic brake valve contain?

A—(1) Brake valve cut-out cock. (2) Safety control cut-out cock, located on the filling piece position. (3) FIRST SERVICE position cock. (4) FULL RELEASE selector cock.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F55-Q—How many driving axles and trucks are on these units?

A—All units are equipped with four driving axles and four traction motors.

F56-Q—What is the function of the middle axle of the six-wheel truck under passenger units?

A—The middle axle is an idler.

F57-Q—What is the horse power rating and engine size of the Consolidation Line units?

—1,600-hp—one 8-cylinder engine, 2,000-hp—one 10 cylinder engine, 2,400-hp—one 12-cylinder engine.

F58-Q—What are the engine speeds?

A—Idling—300 rpm. Full speed—850 rpm.

F59-Q—What is the dynamic braking capacity on all units?

A—2,000 hp. at 880 amp.

F60-Q—What type of engine governor is used on these units?

A—Woodward electro-hydraulic type, with the load regulator included in the governor.

F61-Q—What is the boiler water capacity of passenger units?

A—All passenger units carry a boiler water capacity of from 1,400 to 2,000 gal. depending on railroad specification.

F62-Q—Does dynamic braking affect water capacity?

A—Equipping units with dynamic braking does not affect water capacity.

(Bulletin 1706—101A, page 1)

F63-Q—What is the capacity of passenger unit steam generators?

A—From 2,500 to 4,500 lb. per hour depending on railroad specification.

AIR-BRAKE SYSTEM

F64-Q—What is the main reservoir capacity of these units?

A—Both passenger and freight units are equipped with two main reservoirs with a combined capacity of 56,000 cu in. on A units and 29,500 cu in. on B units.

F65-Q—How is maximum cooling effected?

A—By 27 ft 6 in. of copper finned pipe between compressor and first main reservoir and the same amount between the first and second main reservoirs.

F66-Q—From where is the main reservoir equalizing line taken?

A—The main reservoir equalizing line is taken off after the second main reservoir.

F67-Q—What is the advantage of the extra amount of cooling thus provided?

A—Water will collect rapidly in the main reservoirs and will not continue through to the air brake system provided main reservoir drainage is not neglected.

Supplies

(Bulletin 1706—101-A, page 3)

F68-Q—How much fuel oil is carried on each of the units?
A—1,200 gal. (1,600 gal. as extra).

F69-Q—How much lubricating oil is carried?

A—1,600 hp unit—315 gal. 2,000 hp unit—350 gal. 2,400 hp unit—385 gal.

F70-Q—What is the engine cooling water capacity?

A—1,600 hp—300 gal., 2,000 hp—320 gal., 2,400 hp—340 gal.

F71-Q—How many cubic feet of sand can be carried?

A—20 cu ft.

Transition

(Bulletin 1706—101-A, page 7)

F72-Q—Do the traction motors require transition?

A—Traction motors are permanently connected in series-parallel and hence require no transition.

F73-Q—What is used instead?

A—Automatic field shunting in four steps.

F74-Q—How does shunting differ from transition?

A—Shunting differs from transition in that no power circuits are completely opened.

F75-Q—When operating in multiple unit, can one unit be shut down?

A—If necessary, one unit can be cut out and operation continued with the remaining units.

Throttle Lever

F76-Q—How many positions does the throttle lever have on these units?

A—Ten positions: STOP, IDLE and eight running notches.

Fuses

(Bulletin 1706—101-A, page 13)

F77-Q—How many fuses are aboard?

A—Two. The 350-amp auxiliary generator fuse and the 150-amp external battery charging fuse.

F78-Q—When is the latter fuse used?

A—Only during battery charging in shop.

F79-Q—What is the indication when the auxiliary generator fuse is blown?

A—The ALTERNATOR FAILURE alarm will sound, as alternator excitation will be cut off.

(Bulletin 1706—101-A, page 8)

F80-Q—What is the proper time to replace the fuses?

A—To replace the generator fuse always first shut the

engine down. Also never replace the external battery charging fuse under load.

Main Battery Switch and other Switches in the Electrical Cabinet

F81-Q—Describe and locate the main battery switch.

A—This is a double pole knife switch, located behind a hinged door on engineer's side of electrical cabinet.

F82-Q—What is its function?

A—This switch connects all control and lighting circuits to the battery and must be on in all units.

F83-Q—What other switches are behind the hinged door and adjacent to the battery switch?

A—The traction motor and dynamic brake cut-out switch, ground relay cut-out switch and standby lighting knife switch.

Circuit Breakers

F84-Q—What do the circuit breakers substitute for?

A—Circuit breakers instead of fuses are used in all control circuits.

F85-Q—In what other way do the circuit breakers function?

A—As manually operated switches.

Engineers Breaker Panel

F86-Q—Where is this panel located and what does it contain?

A—It is located in front of the controller and contains two rows of breakers. The top row includes the breakers for lights. The second row includes the control, fuel pump and generator field breakers and is fitted with a lever for locking the breakers in OFF position in a trailing cab.

F87-Q—What functions to operate alarm bells in all units?

A—A signal button labeled attendant call operates alarm bells in all units.

F88-Q—What provides for heater and defroster control?

A—Rheostats are provided for this purpose.

Cabinet Breaker Panel

(Bulletin 1706—101-A, page 14)

F89-Q—Where is this panel located and what does it contain?

A—This panel is located on the electrical cabinet and contains breakers as follows: alternator field, locomotive lights, heater and defroster, control cut out, dynamic brake (if used), electro-pneumatic brake (if used), train control (if used), dynamic brake unit switch (on units with dynamic braking).

F90-Q—What is the purpose of the alternator field breaker and when must it be on?

A—It connects the alternator field to the auxiliary generator and must be on in all units.

NEW DEVICES

(Continued from page 19)



Journal Box Jig Grinder

Uniplane jig grinding, as it is referred to by the manufacturer, is said to accurately surface that portion of the journal box which engages the lid. The method assures improved closure and reduces the possibility of foreign matter entering the lubricating chamber.

The grinder is composed of a portable fixture which attaches to the side frame casting through the journal box lid hinge pin hole and pivots about this pin on the same axis the eventual lid will pivot. The fixture adjusts up or down and can be gauged to the individual journal box. In operation, an abrasive wheel radiates across the fit surface until it is ground free from variations and obstructions.

These grinding fixtures will be made available to all railroad car shops as a portable tool for resurfacing present equipment.

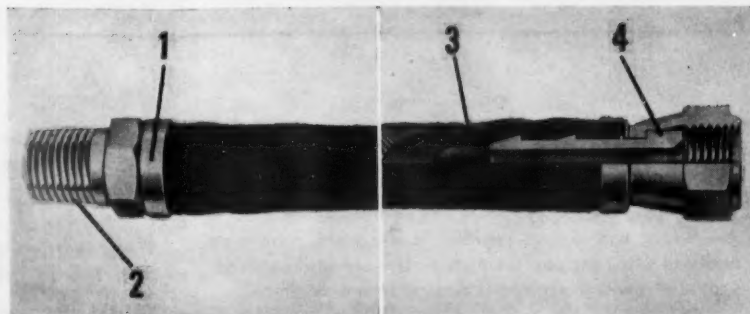
Buckeye Steel Castings Company, Columbus, Ohio.

Insulating Tape in Colors

The Bishop Manufacturing Corporation announces the availability of Bi-Seal, self-bonding insulating tape, in seven colors including black, white, red, yellow, orange, green and blue. The new series is designed for interior use where color identification of lead wires is important.

Made of polyethylene based compound, Bi-Seal is self-bonding. When applied, it fuses into a solid mass that creates a tight permanent seal over the splice. Because of its elasticity and mechanical strength, it molds itself into a conformed sheath over complex shapes. There is no right or wrong side, or tacky surface to pick up foreign matter or stick together during application.

The tape retains its flexibility at temper-



Cap (1) protects hose end. Fitting types (2) include male pipe, SAE male and female, an SAE inverted male and female. Cotton braid reinforced synthetic tube hose (3) grips fitting. Brass socketless fittings (4) are designed to install quickly and easily.

Socketless Fittings and Hose Kit

Socketless fittings and hose, designed for use on low- and medium-pressure fuel, air, water and oil lines, are available in standard kits, each containing 17 fitting sizes and 24 ft of hose each both in 1/4- and 3/8-in. sizes.

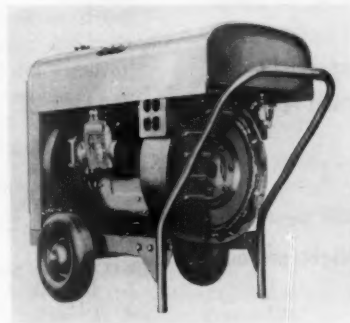
The fittings and hose combination do

not require a clamp or socket to apply. The hose is pushed on the fittings and when hand pressure is applied a tight grip is formed. The fittings and hose are marketed in 1/4 and 3/8 in. sizes in the kit and up to 5/8 in. in bulk stocks.

Aeroquip Corporation, Jackson, Mich.

atures as low as minus 67 deg. F. Once applied the layers of tape cannot be separated, and provide a water-tight seal. It has an average dielectric strength of more than 1,000 volts per mil of thickness.

Bishop Manufacturing Corporation, Cedar Grove, N. J.



Portable Power for Hi-Cycle Tools

An engine-driven, 360-cycle electric generator is now available which can be moved about to any needed location in shop or yard for supplying power to high-frequency tools.

The generator is a 10-kva (8-kw) 220-volt, 3-phase, 360-cycle machine which is direct-driven from the engine. It also supplies 1,500 watts of 115-volt dc power for the operation of lights and universal tools using commutator-type motors. The generator rotor is cast aluminum with permanent magnets, mounted on ball bearings supported by a quill from the engine

crankcase, and driven through a flexible steel disc coupling.

The 4-cylinder, 4-cycle engine has a 2 1/2-in. bore, and a 3 1/8-in. stroke, and runs at 2,160 rpm. It has cast aluminum head, crankcase, gear cover and intake manifold. The cylinder block is cast iron with Stellite inserts and Stellite-faced valves. It has a built-in combination governor and coolant pump for forced circulation. The engine has magneto ignition, and a self-recoiling rope starter.

The set on a steel chassis with semi-pneumatic wheels, weighs 395 lb.

Waukesha Motor Company, Waukesha, Wis.

Strong Plastic Film

A new plastic film, called Mylar, developed by Dupont, combines high mechanical and dielectric strengths with exceptional resistance to solvents and organic and inorganic gases. Used as an electrical insulator, it is also made into thread and woven with metal to produce brilliant fabrics suitable for drapes and hangings.

In sheet form, it is made in thicknesses from 0.00025 in. to 0.0075 in. thick in three types, two of which are for use as a dielectric, and one for plastic glazing and glass replacement applications.

Mylar remains flexible and stable over a range of temperatures from -60 deg C to 150 deg C. Its melting point is 250 to 255 deg C and its 60-cycle dielectric strength at 25 deg C is 4,000 volts per mil for a 2-mil thickness. Its tensile strength is 17,000 to 25,000 psi.

E. I. Dupont de Nemours & Co., Inc., Wilmington, Del.

(New Devices continued on page 98)

SUPPLY TRADE NOTES

OWENS-CORNING FIBERGLAS CORPORATION.—James D. Bettridge, Toledo branch sales manager, has been appointed



J. D. Bettridge

manager of the Transportation Products Sales Division. Robie L. Cone, Jr., salesman in Detroit, succeeds Mr. Bettridge at Toledo.

GISHOLT MACHINE COMPANY.—Gisholt has announced plans for leasing machine tools, to cover standard machines, plus required electrical equipment. Three plans are available, each with or without an option to purchase.

WOOD TREATING CHEMICALS COMPANY.—William W. Hanly, Jr., has been elected vice-president. Mr. Hanly will continue as manager of sales to the wood-preserving industry, but will also supervise the company's overall promotion of the Monsanto Chemical Company's Penta.

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION.—J. S. Chisholm has been appointed manager of the Salt Lake City factory branch. Mr. Chisholm had been manager of the Electro-Motive factory branch at Los Angeles.

AMERICAN BRAKE SHOE COMPANY.—Robert J. Ely has been appointed assistant chief metallurgist. Mr. Ely, formerly process metallurgist, is located at the company's Research Center in Mahwah, N. J.

LINCOLN ELECTRIC COMPANY.—William Irrgang, executive vice-president, has been elected president and general manager. James F. Lincoln, elected chairman of the board, will remain active in direction of company policies.

AMERICAN HOIST & DERRICK CO.—Ray J. Dervej has been appointed general sales manager.

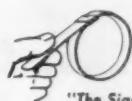
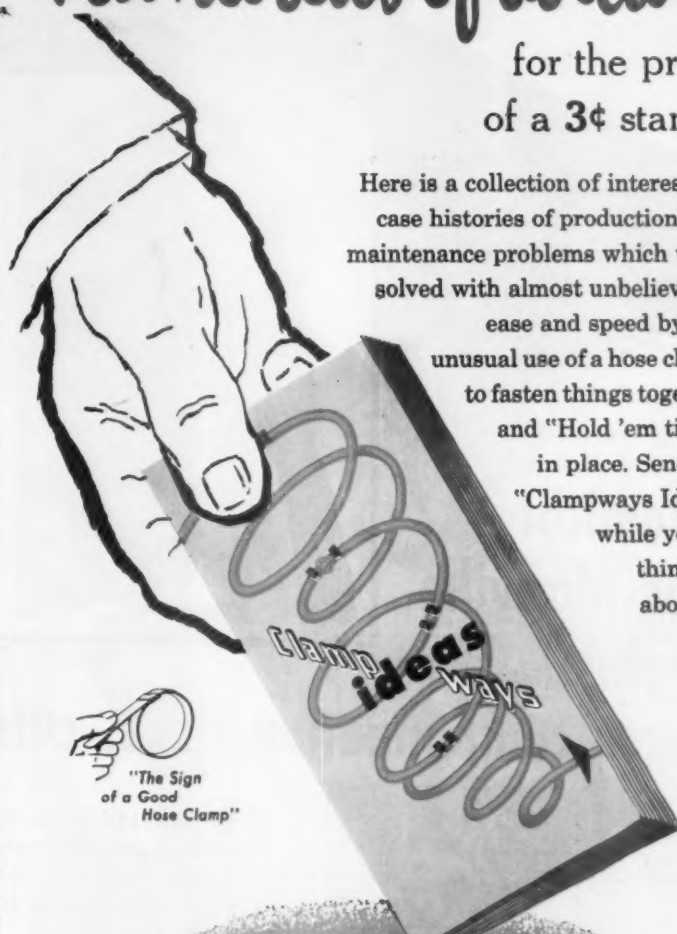
NATIONAL MOTOR BEARING COMPANY.—Richard T. Coyne, former vice-

ideas...worth

hundreds of dollars

for the price
of a 3¢ stamp

Here is a collection of interesting case histories of production and maintenance problems which were solved with almost unbelievable ease and speed by the unusual use of a hose clamp to fasten things together and "Hold 'em tight" in place. Send for "Clampways Ideas" while you're thinking about it.*



"The Sign
of a Good
Hose Clamp"

PUNCH-LOK Company



4800

Punch-Lok Company
Dept. N, 321 North Justine Street
Chicago 7, Illinois

send me **Clampways ideas**
FREE

Firm Name _____

My Name _____ Title _____

Address _____

City _____ State _____

*Now! Low cost protection against
boxcar infestation...*

**Economical
Johns-Manville
Stonefelt (Type K)**

reduces contamination risks, cuts damage claims



Open corruga-
tions filled with
Stonefelt.



Full-size pieces of
Stonefelt tempo-
rarily in position.

End lining is ap-
plied the usual
way.



Many costly claims can be avoided by filling the spaces behind boxcar linings where contaminating conditions can exist. When you protect these areas with Johns-Manville Stonefelt® (Type K), danger from insect infestation, corrosion, mold and odor is controlled at the source.

Stonefelt is made of specially treated mineral fibers felted into lightweight batts that *will not settle or shake down*. Strong and durable, its uniform structure of finely divided fibers stops the entrance of insects; acts as a barrier against dust and dirt.

Stonefelt fibers are inert, are not affected by moisture, will not sustain insect life. Virtually indestructible in service, Stonefelt provides continued protection against mold, odors and corrosion.

Stonefelt Type "K" is furnished in cut-to-fit box car sets. Individual pieces are supplied up to 30" x 60" to assure maximum ease of handling. Regular car men can easily apply this material.

Ask your Johns-Manville representative for complete data and samples, or write to Johns-Manville, Box 60, New York 16, N. Y.



Johns-Manville

**96 YEARS OF SERVICE
TO TRANSPORTATION**

president of the Pressed Steel Car Company has joined National Motor Bearing as assistant to the president, with headquarters at Chicago Field Building offices. Mr. Coyne will be concerned with marketing and servicing products for railroads.

UNITED STATES STEEL CORPORATION.—*A. F. Stuebing*, assistant to manager, high-strength-steel sales, has retired and has been succeeded by *Stanley C. Lore*. Mr. Stuebing was managing editor of the *Railway Mechanical Engineer* (now *Railway Locomotives and Cars*) 1919-23.

UNITED STATES STEEL SUPPLY DIVISION.—*J. Gibson Brown*, assistant to vice-president—operations, at Chicago, has been appointed assistant vice-president—engineering.

GENERAL ELECTRIC COMPANY.—The following have been appointed to managerial engineering posts in the locomotive and car equipment department: *Otto A. Keep*, manager of control engineering; *Richard Lamborn*, manager of motor engineering; and *Charles L. Reed, Jr.*, manager of engineering administration.

T-Z RAILWAY EQUIPMENT COMPANY.—*Walton R. Collins*, 90 West street, New York 6, has been appointed exclusive eastern sales representative for T-Z.

INTERNATIONAL RAILWAY CAR COMPANY.—*Frank E. Ross, Jr.*, 3408 Washington blvd., St. Louis, has been appointed district sales representative for St. Louis and Southwest territory.

WYANDOTTE CHEMICALS CORPORATION.—*Paul A. Finn* has joined the



P. A. Finn

industrial and railway sales service staff. Mr. Finn will work for Wyandotte's Dallas office, but will headquarter in Houston.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.—*Art Youwer* has joined the transportation division of Minneapolis-Honeywell as service engineer in the Chicago office. Mr. Youwer was previously mechanical inspector for Pullman-Standard Car Manufacturing Company.

TEMPLETON, KENLY & COMPANY.—*Charles E. Barnes* has been appointed special railroad representative for Templeton, Kenly. Mr. Barnes, former sales
(Continued on Page 96)

They're Kind to Commutators!

In many cases—especially under difficult service conditions—Stackpole diesel-electric brushes have actually improved poor commutator conditions that developed when other makes of brushes were used . . . with adequate brush life in the bargain!

STACKPOLE CARBON COMPANY, St. Marys, Pa.

STACKPOLE

Diesel Brushes

giving your freight

MORE CO

is our business

Freight Car Trucks

QUALITY PROVED

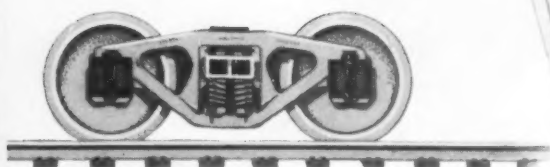
by Millions of

Service Miles...



SCULLIN STEEL CO.

SAINT LOUIS 10, MISSOURI



NEW YORK
CHICAGO
BALTIMORE
RICHMOND, VA.
CLEVELAND

"WOLMANIZED" ...
clean pressure-treated
lumber.
Service-proved
to be odorless,
paintable, nonbleeding,
noncorrosive

KOPPERS COMPANY, INC.
Wolman Preservative Department



Pittsburgh 19, Pennsylvania

*Wolmanized is a registered trademark
of Koppers Company, Inc.



Wolmanized
PRESSURE TREATED
Lumber
Stops Rot and Termites

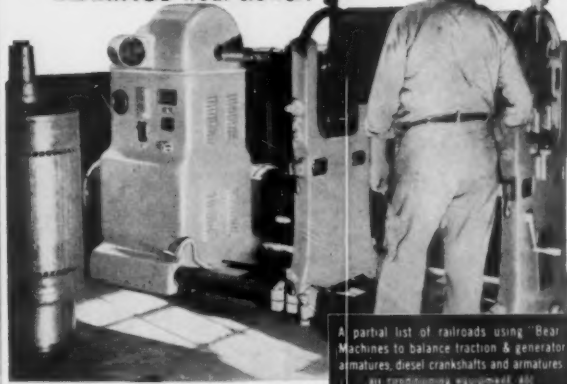
America's Railroads Agree: **DY-NAMIC BALANCING** **IS NECESSARY TODAY!**

AIR CONDITIONING operates with less vibration!

WHEELS run smoother!

ARMATURES last longer!

BEARINGS wear slower!



At B & O Mt. Clare Shops, Baltimore, Md., every traction motor and generator armature is Dy-Namically Balanced before reassembly, to reduce vibration and extend motor life.

Special "Bear" Models for Railroad Balancing Requirements make it Easier, More Economical to get the Benefits of **Dy-Namic Balancing**

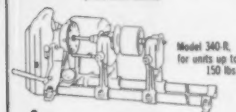
Today, there is sufficient performance data accumulated by railroads to make it evident that Dy-Namic Balancing is an important factor in cutting railroad maintenance costs. Dozens of leading railroads, such as those listed above have found that the adoption of Dy-Namic Balancing as a standard maintenance operation has been more than warranted by savings in lower costs, repairs, labor and reduced lay-up time. "Bear" Models, specifically designed for railroad work bring you ALL THE BENEFITS of DY-NAMIC BALANCING because:

- they make it possible to balance armatures with minimum time and effort.
- they enable operator to change from one shaft size to another in minutes.
- they are highly accurate and dependable in all measurements.
- they prevent the "weaving action" often caused by static balancing alone because they do both static and dynamic balancing simultaneously.
- they are easy to operate... do not require skilled technicians.

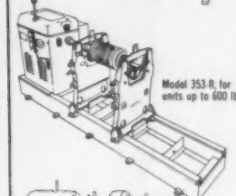
A partial list of railroads using "Bear" Machines to balance traction & generator armatures, diesel crankshafts and armatures at conditioning equipment, etc.

- The Pullman Company
- Chicago, Rock Island, & Pacific R. R. Co.
- Illinois Central System
- Chicago & Eastern Illinois R. R.
- Missouri-Kansas-Texas R. R. Co.
- Chicago, Burlington & Quincy R. R.
- Norfolk & Western R. R.
- Reading Company
- Baltimore & Ohio R. R.
- Chicago, Milwaukee, St. Paul & Pacific
- New York Central Railroad
- Fort Worth & Denver R. R.

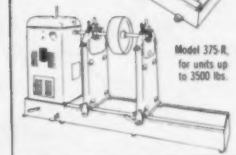
Model 400 R, for units up to 8 tons
(illustrated above)



Model 340 R,
for units up to
150 lbs.



Model 353 R, for
units up to 600 lbs.



Model 375 R,
for units up
to 3500 lbs.



FREE BULLETINS

Get full details by
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Bulletins on RAILROAD
DY-NAMIC BALANCING.

Write Bear Mfg. Co., Dept. R-2, Rock Island, Ill.

"BEAR"

STATIC AND **DY-NAMIC BALANCING** MACHINES

manager for Griffin Wheel Company, has established headquarters at the Barnes Supply Company, 55 New Montgomery Street, San Francisco, to service the Southern Pacific, Western Pacific and Pacific Fruit Express.

JOSEPH T. RYERSON & SON, INC.—*Theodore F. Eichstaedt*, manager of the machinery and tool department at the Chicago plant, has been appointed assistant manager of the Machinery and Tool division.

AJAX-CONSOLIDATED COMPANY.—*Fred R. Brookmeyer* has been appointed sales engineer at 4615 West 20th street,

Chicago, which is now the address of the company's general office and plant. *F. R. Bretz* has rejoined Ajax-Consolidated as consulting engineer.

WALWORTH COMPANY.—*Alfred J. Eichler* has resigned as president and has been elected chairman of the board of directors. *Fred W. Belz*, executive vice-president, has been elected chief executive officer.

UNION CARBIDE & CARBON CORP., NATIONAL CARBON COMPANY.—*C. J. Chapman* has been appointed general sales manager, industrial products.

A. M. BYERS COMPANY.—*Robert S. Villforth* has been appointed field service



R. S. Villforth

engineer in the New York division. Mr. Villforth will specialize in railroad sales, with headquarters at 30 Rockefeller Plaza.

GENERAL STEEL CASTINGS CORPORATION.—*Albert M. Schieler*, district



A. M. Schieler

sales manager at Granite City, Ill., has been appointed assistant vice president—sales.

HUCK MANUFACTURING COMPANY.—*Turney & Beale*, Bayside, N.Y., and the *California Rivet Company*, Glendale, Calif., have been appointed east and west coast distributors, respectively.

FAIRBANKS, MORSE & CO.—A new full-color 8m movie, "Opposed-Piston Horsepower," shows the installation of a diesel engine on a locomotive underframe. The film, designed for study groups interested in the O-P engine for rail service, is available for booking free of charge, except for transportation, from Modern Talking Picture Service, 140 East Ontario street, Chicago 11.

Obituary

GUILFORD S. TURNER, president of the T-Z Railway Equipment Company, at Chicago, died July 12.

CHARLES A. CRANE, 73, a former engineering chief of Templeton, Kenly & Co., died July 21.



**mr.
nafco*
says ...**

"If there were a 'Mr. America' contest among Diesel Filter Cartridges, you can be sure I'd enter!"

"REASON?"

With extra special features like tough outer covering; machine-packed waste; additional filtering agent in mesh tubing covering center tube; reinforced steel center tube with free flow perforations; and two-way oil gasket ...

... how could I lose?"

*"I'm the trade-mark of the Nash-Finch Company—and registered too!"

"Send for my free cartridge reference chart!"

NASH FINCH CO.

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**IN MODERN
RAILROADS...**



**WATSON-STILLMAN
SOCKET-WELDING FITTINGS...**



***Prevent Pipe Failures
... And They're Easy to Install***

Watson-Stillman Forged Steel Socket-Welding Fittings provide strong, tough, trouble-free joints for air brake piping and for steam, air, oil and water lines in railroad cars, yards and shops. They're drop-forged of high quality steel for maximum resistance to shock and vibration.

Installation is easy. Just slip the fitting over the pipe and weld. The deep socket supports and aligns the pipe. No need for tack welding, backing rings or special welding fixtures. The clean, outside-the-pipe fillet weld prevents the formation of welding icicles inside the pipe. And ample "come-and-go" in the socket makes fussy accurate measurement and cutting of pipe unnecessary.

For safe, reliable service...for greater protection against costly piping failures...install Watson-Stillman Forged Steel Socket-Welding Fittings. Available for schedule 40, 80, 160 and Double-Extra Heavy pipe in sizes $\frac{1}{8}$ " to 4". Fittings include elbows, tees, crosses, couplings, air brake flanges, unions and a variety of plugs and bushings.

Write for information today.



WATSON-STILLMAN FITTINGS DIVISION

H. K. PORTER COMPANY, INC.

Roselle, New Jersey

AJAX WATER COOLERS

FOR DIESEL ENGINES

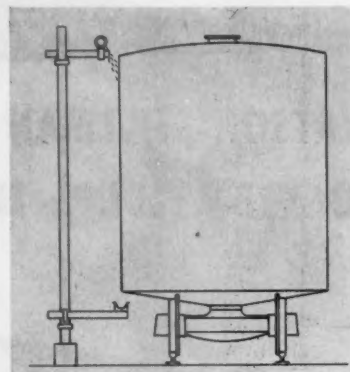
Note slide-out feature for easy accessibility of motor and cooling unit.

Illustrated: Circulating Cooler—a model, type and size for every application.

AJAX CONSOLIDATED COMPANY

NEW DEVICES

(Continued from page 90)



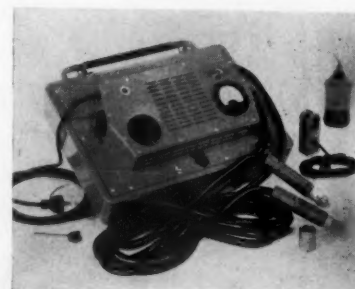
Car Paint Stripping Rack

Cost of stripping old paint from freight cars, passenger cars and locomotives can be sharply reduced, and the time cut down to minutes, with the help of this paint stripping rack.

The rack also serves to save paint stripping solution by returning the run-off to the solution tank for recirculation. By using a stripping rack on both sides of the track, cars can be stripped in a matter of minutes. The equipment can be made up by labor forces from readily available shop materials. Free schematic blueprints are available.

Pennsalt No. 23 stripping compound, a concentrated alkaline material is used in the heated solution tank. This product will remove any number of coats of paint and will rinse clear without leaving white deposits.

Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia 7.



Magnetic-Particle Test Unit

A Norelco magnetic-particle test unit called Portaflux, that weighs only 45 lb, is designed to locate surface defects in rough castings, bar stock, forgings and shop welds. It is useful for examinations at various stages of production; and during service for revision and repair. East portability makes the unit especially valu-

able where it is necessary to take test equipment to field locations.

Objects to be checked are magnetized either by passing a current directly through the metal or through a surrounding cable in the form of a coil. Magnetic iron oxide or precipitated iron powder is distributed over the surface of the magnetized object and alignment of the particles is such that the defect is clearly located.

The unit has two heavy-duty, oil-resistant insulated cables with heavy-duty, renewable prods that carry currents up to 600 amp at a maximum voltage of 1.5 volts. A special metal coupler is provided for connecting the prods together when it is desirable to use the wrap-around coil method.

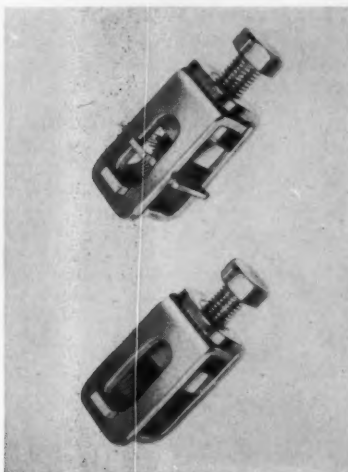
The control panel has an indicating-type meter with a range of 0-600 amp. There is a three-way selection switch for different ranges and a pilot lamp indicates when the high range is in use.

A 6-volt work-lamp with magnetized base, extension cord and plug is provided for the convenience of the operator. In addition, a 110-volt convenience outlet is built-in to accommodate auxiliary equipment.

The unit also has an indicating device which shows the direction of the flux in the magnetized object and indicates the presence or absence of sufficient field strength.

Power may be obtained from any 110-volt, single phase a-c convenience outlet through a cord and plug which is provided.

North American Philips Company, Research & Control Instruments Division, 750 South Fulton avenue, Mount Vernon, N.Y.



Tap Connector

The new tap connector, illustrated, is said to make stronger, lower cost street taps, service drops, dead-end loops, T-taps, transformer and machine tool connections and ground connections.

Among the advantages claimed for the connector are greater holding pressure, provided by a hex set screw which can be tightened with a wrench. An extra large pad and stirrup distribute the pressure over the connection area, reducing deformation of the wire and making a low-resistance connection. As a positive check on the connection, the electrician

GARLOCK REPLACEMENT PARTS

Gaskets—Packings—Molded Rubber Rings for diesel locomotives...



Section of Garlock's diesel parts stock room

NOW pre-stocked in handy boxes,
ready for immediate shipment



Packaging and labeling
diesel parts after
inspection.

Garlock diesel replacement parts—gaskets, packings and molded rubber rings—are boxed in convenient quantities for ease in handling, storing and redistribution to shop men, overhaul shops and terminal points.

All boxes are labeled for instant identification—no cross-reference parts list needed.

Garlock diesel gaskets, packings and molded rubber rings are giving completely satisfactory service on leading railroads. Specify Garlock diesel replacement parts and write us for complete parts-and-price list.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

Branch Offices in Most Principal Cities

GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS, RUBBER EXPANSION JOINTS





THE BEST VESTIBULE CURTAIN...

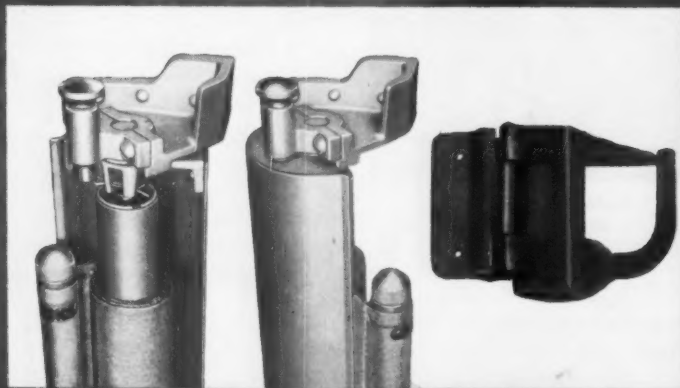
morton

To Meet Your Needs:

**Adjustable or Non-
Adjustable
Grooved or Plain
With or Without
Snap-Button Holes**

- toughest spring steel rollers
- cold-rolled welded steel tubing
- snap-button damage protection for premature pull-a-parts
- material and accessories to specification

CURTAINS, PARTS, HANDLES, HOOKS and BRACKETS for ALL REQUIREMENTS



Revolving shield
and casing
(shield open)

Revolving shield
and casing
(shield closed)

The new "B-J" vestibule curtain
release handle. Positive releasing
feature . . . service-proven.

morton

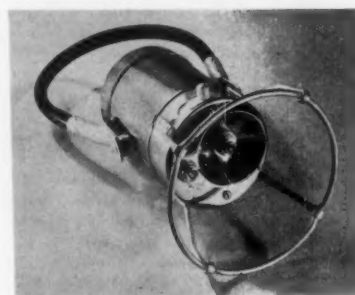
MANUFACTURING COMPANY
5125 West Lake Street, Chicago 44, Illinois

can see the joint through the sides of the connector as it is being made.

Because of the wide capacity range of each size, the tap connector is an all-in-one unit. There are no separate pieces to fall off or get lost. Three sizes handle a range of combinations that formerly required as many as seven sizes of connectors. According to the manufacturer, this feature will make the connector easier to stock and electrical men will be able to do more jobs with fewer sizes.

It is available with or without spacer bars for connecting copper-to-aluminum or steel or aluminum to steel cables. These bars are also attached to the unit so they will not fall off or present a stocking problem.

Ideal Industries Inc., 1560 Park avenue, Sycamore, Ill.



Trainman's Lantern

Known as the Model 202-S, this dual purpose lamp has several new features. It is equipped with twin bulbs and can be used either for spotting or signalling. The spot light produces a pin-point spot with no dark circles. Sockets are nylon insulated and the switch is completely waterproof.

The lantern is drawn in one piece from zinc-coated steel and is finished in blue enamel for rust protection. Its wire guard is rigid and is mounted with eight rivets. The reflector is formed from stainless steel for brightness and freedom from rust.

Star Headlight & Lantern Co., Honeoye Falls, N. Y.



Liquid-Tight Conduit

A flexible, liquid-tight conduit for electrical wiring, called Sealite, has been given Underwriters' Laboratories approval for use in wet locations. Made with a flexible galvanized steel core, positive ground and tough synthetic cover, Sealite protects

(Continued on page 103)

NOW—SAVE UP TO
\$200. PER FREIGHT CAR
with new Hyatt roller
bearing journal boxes!



**With the same ease of assembly and
removability—shock-reducing free lateral—
and all the superior features that have made
HYATT America's largest builder of
railroad roller bearings!**

Improved manufacturing methods have enabled us to reduce the cost of new HYATT Roller Bearing Journal Boxes for freight cars up to \$200 per car set . . . without the slightest sacrifice of quality.

This significant saving in capital investment makes it economically sound to take advantage of the tremendous operating economies of HYATT Roller Bearings on thousands more freight cars. Before you buy another journal box of *any* kind, write or wire us for full details. *Hyatt can help you save hundreds—perhaps hundreds of thousands—of dollars!* Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT

STRAIGHT 

BARREL 

TAPER 



"... More than 50% of our employees are on the Payroll Savings Plan ..."

PAUL W. JOHNSTON

President, Erie Railroad

"We on the Erie Railroad are extremely proud that 50% of our employees are on the Payroll Savings Plan for U.S. Defense Bonds. These thousands of employees are regularly providing for their own future security and at the same time contributing to the strength of our national defense. The American habit of thrift and regular purchase of U.S. Defense Bonds Shares in America are evidences of good, sound citizenship."

Good, sound citizenship . . . the American habit of thrift . . . a belief that a strong America is a secure America . . . a management that makes the Payroll Savings Plan available to *all* its employees—these are the reasons why more than 50% of Erie Railroad employees are enrolled in the Payroll Savings Plan.

For the same four reasons, more than 7,500,000 employed men and women in thousands of other companies are active members of the Payroll Savings Plan—their take-home savings in the form of U.S. Defense Bonds total more than \$150,000,000 per month.

Is your company in the "more than 50% participation" group? If it isn't, please bring this page to the attention of your top executive. Point out to him—

Two Simple Steps to a Successful Payroll Savings Plan

1. Phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D. C.
2. Your State Director, Savings Bond Division, will show your company how to conduct a simple person-to-person canvass that will put a Payroll Savings Application Blank in the hands of *every* employee.

That is all management has to do. Your employees will do the rest. They, like the employees of the Erie Railroad, want to provide for their personal security and at the same time do their part in helping to keep America strong.

The United States Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

RAILWAY LOCOMOTIVES AND CARS



wiring against moisture, dirt, chemicals, and corrosive fumes. The conduit is made in five sizes from $\frac{3}{8}$ in. to $1\frac{1}{4}$ in. inside diameter.

American Brass Company, American Metal Hose Branch, Waterbury, Conn.



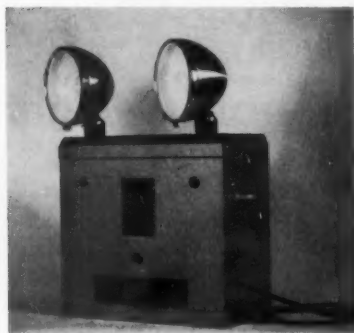
250 Amp DC Arc Welder

A 250-amp dc arc welder with a 4-cylinder air-cooled engine has been made available for field and general maintenance work in railroad shops. The generator of this welder is the multi-range type with modifications to provide less bulk and lighter weight. It is directly connected to an air-cooled Wisconsin VF4 engine.

A control panel is located at the generator end of the unit and has mounted on it the range wheel, volt-amp adjuster knob, cable terminals, power outlet receptacles and starter button for a battery equipped unit. Engine choke, hand throttle and magneto switch are all located at the engine end for convenience in starting.

This model is provided with a power outlet receptacle for use only when the unit is not being used for welding.

Hobart Brothers Company, Troy, Ohio.



Nickel-Cadmium Emergency Light

A Nicad emergency lighting unit provides an auxiliary six-volt light source which will come on automatically when the normal a-c supply fails. Power is then

(Continued on page 106)

"MAGIC CARPET" for worn box car floors



Re-Surface **BOX CAR** floors with

Plastinail*

OXYCHLORIDE CEMENT BOX CAR FLOORS

S-T-R-E-T-C-H your maintenance dollars with the **CLASS "A"** floor that stays in **CLASS "A"** condition longer for less! **PLASTINAIL** — the practical, economical "magic carpet" replacement for worn box car floors can be laid down in 16 man-hours time. Easily installed **PLASTINAIL** decks provide a monolithic surface that is quickly cleaned, easily maintained, completely nailable, and does not splinter. "In use" service proves that **PLASTINAIL** decks have twice the strength and 3 times the **Class "A"** service life as wood alone! To reduce your all-around costs and to better your per-car-day per mile returns . . . specify **PLASTINAIL** as the **CLASS "A"** replacement for worn box car floors!

CHECK THESE ADVANTAGES

- Greater economy — costs less to install, maintain, clean and repair
- Stronger — compression strength of 3,500 # P.S.I. — density equal to hard maple
- Nailable as wood — withstands impact; deflects without cracking
- Odorless; dustless; unaffected by heat, cold or moisture
- SAFER — not slippery, fire-proof, non-sparking
- Smoother — monolithic surface reduces abrasive damage to bags, cartons — seals deck, makes it ideal for bulk laden
- Double the strength, triple the **CLASS "A"** service life of wood alone

*Registered trade name of F. E. Schundler & Co., Inc.

F. E. SCHUNDLER & CO., Inc.

504 RAILROAD STREET • JOLIET, ILLINOIS

MILLIONS OF TONS OF FREIGHT RIDES ON **CLASS "A"** **PLASTINAIL** FLOORS





234

Centrifugal Lining by Bearing Experts

*... that's one reason
why you get*



MAXIMUM TROUBLE-FREE MILEAGE

with **MAGNUS TRACTION MOTOR SUPPORT BEARINGS**



THESE High Mileage bearings are precision lined with heat-resistant Satco metal, centrifugally applied. This assures uniform hardening and density and a permanent bond—a lining that stands up longer under high temperatures, gives maximum resistance to wear and load.

There are other important advantages, too. Interchangeable double keeway permits any bearing to be used on either the commutator or pinion end of the shaft. Perfectly mated bearing halves are micrometer tested under load, assuring paralleled ID and OD. And the hi-strength brass backs are finish bored on special precision machines.

These features combine to give you a bearing you can depend on for maximum trouble-free performance between motor overhauls. For complete information, send for your copy of Bulletin No. 6000. Magnus Metal Corporation, 111 Broadway, New York 6, N. Y.; or 80 East Jackson Blvd., Chicago 4, Ill.

IT PAYS TO PLAY SAFE!

**Use only NEW Magnus Bearings
for replacement purposes**

New High-Mileage Magnus bearings cost so little because of skilled production methods they can usually be furnished for less than the cost of rebuilding worn bearings. And only new Magnus bearings give full protection to your big investment in Diesel locomotives.

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

...for every type and make of diesel locomotive

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

**Here's A New
Air-Operated
Hydraulic Jack
That Makes Lifting,
Lowering and
Straightening Jobs
A Pleasure**

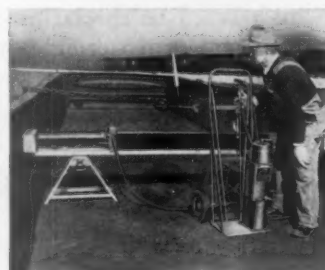


This Duff-Norton 30-TON capacity jack operates from any air supply of 80 to 100 lbs.—portable—offers choice of any or all of 5 interchangeable hydraulic rams, each totally enclosed in special "grit guard" for long, trouble-free operation in any position. Ram can be stopped precisely and instantly at any position when raising or lowering by removing finger from spring loaded air valve mounted on truck. Safe, economical, easy to use, these new air-hydraulic jacks are winning new friends in railroad shops everywhere.

For complete specifications, write today for bulletin AD 25-G, the world's oldest and largest manufacturer of lifting jacks. The Duff-Norton Manufacturing Company, P. O. Box 1889, Pittsburgh 30, Pennsylvania, Canadian Plant—Toronto 6, Ontario.



1. Loads go up or down quickly.



2. The operator is always safe.

DUFF-NORTON

"Giving Industry A Lift
Since 1883"

Jacks

supplied by a Nicad steel-encased, alkaline storage battery.

Mounted on top of the unit are two six-volt lamp heads and reflectors. Front panel mounting includes a high-rate charge timer that can be set from 0 to 12 hours, an amber neon readiness light, a red neon high rate light, a 6-volt light switch and a push button test switch. A removable sub-assembly carries the transformer, rectifier, cut-over relay, timer, trickle-charge resistor and all other components.

The circuit is designed to maintain the battery on trickle-charge, and to permit recharging the battery within 12 hours. The duration of the high rate charge is set by the timer. The red neon pilot light, indicating that the high rate is on, goes out when the charge is completed. The amber neon pilot light indicates that the a-c is on and the unit is in standby condition, ready to operate. If the 6-volt light switch is open, the amber light will be out, thereby indicating the unit is not in readiness condition. The push button test switch makes it possible to check operation of relay, battery and lights.

Nickel Cadmium Battery Corporation,
Easthampton, Mass.



Hot Liquid Spray Gun

Hot spraying of paint, microcrystalline waxes, thermoplastics, anti-corrosive compounds, etc., which melt in the range between 175 and 400 deg F, is said to be simple with the Volumaire Model R 350 spray gun. The unit atomizes by air volume rather than by air pressure.

For hot spraying, air is supplied to the device at 3,500 cu ft per hr and 1½ lb per sq in. pressure, heated to the melting point of the material. An electrical resistance heater of 400 watt rated capacity in the spray gun container holds the material at the approximate spraying temperature. Hot sprayed material reaches the work surface borne by and followed by hot air, hence has time to penetrate, adhere and establish a uniform surface coating before normal temperature loss causes resolidification.

One spray nozzle handles all materials and no special fittings or additional nozzles are required at any time. The jet spray can be varied from a ½-in. dot to a 12-in. swath. It is powered by a ¼-hp 110-volt universal motor and is connected to the

gun with a $\frac{3}{4}$ -in. diameter air hose. A handle and shoulder strap permit easy carrying.

Roxon, Inc., 50 Broad Street, New York 4.

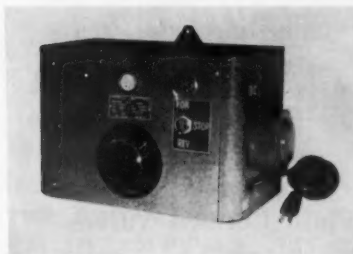


Portable Power Plants

Light weight, for easy portability, has been stressed in the design of two new Wincharger Engine-Generators. The model F2500 delivers d-c power, has an output of 2,500 watts and weighs 148 lb. The model F3000 develops a-c power and has a continuous rating of 2,000 watts. It also weighs 148 lb.

The light weight of the units has been achieved partly through the use of an aluminum base and aluminum guard, and also by redesigning in order to obtain greater compactness. Wisconsin AKN and Briggs & Stratton No. 14 engines are supplied with these units.

Wincharger Corporation, Sioux City, Iowa.



Rectifier for Variable-Speed Drive

A line of variable voltage rectifier units, designed to eliminate the need for variable speed pulleys, drives, belts, etc., is announced by the American Rectifier Corporation. There are two types; those with single-phase input from $\frac{1}{2}$ hp to 3 hp; and three-phase input from $\frac{1}{2}$ to 75 hp.

These manually-operated, self-contained units may be used to convert any ordinary d-c motor into a variable speed motor from zero to rated speed or above. The



"Good tools dressed in overalls"...

* SAVE WITH
Snap-on
BLACK FINISH

Industrial Wrenches

HERE'S ONE PLACE you can cut costs without a single nagging doubt about quality! Snap-on's Black Finish wrenches are identical with other Snap-ons—*except in finish*. Flawless chromium finish costs money. Black finish passes substantial saving on to you. Now available in a wide range of open end wrenches ($\frac{1}{4}$ " to $1\frac{5}{8}$ "), offset box-sockets, long and short combinations, sockets and handles ($\frac{1}{2}$ " and $\frac{3}{4}$ " drives), and pliers. Also available in unplated natural finish. Snap-on's Railroad Division will be glad to supply complete literature on standard and special railroad tools. Write for catalogs today.



SNAP-ON TOOLS CORPORATION
RAILROAD DIVISION

8130-I 28th Avenue • Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

For Fast, Low-Cost Removal of Oily, Greasy Dirt... ANYWHERE!

From Diesel Engines...

Two men in 1-1½ hours will do a better cleaning job on road units than several men using wasteful hand methods.



From Trucks and Underbodies...

The quick, sure and thorough method that cuts man hours way down.



From Engine Pits...

A workmanlike means of doing what always used to be a messy operation.



From Concrete Floors...

Keep floors clean and safe. Remove accumulations of greasy, oily dirt.

The cleaning solution you make up with Diesel Magnusol, using one part Magnusol concentrate to eight parts kerosene, diesel oil or safety solvent, is harmless to paints, to metals, and to personnel. It is fumeless, non-toxic and non-flammable. You spray it on...let it soak in...and rinse away with water to leave thoroughly cleaned surfaces.

Use Diesel Magnusol for a Month!

Order a trial drum of Diesel Magnusol. Use it for a month according to our directions. If you are not completely satisfied, we will cancel the full invoice.



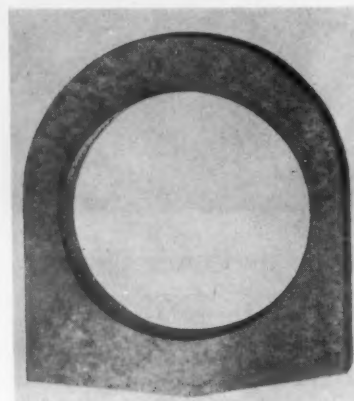
Railroad Division
MAGNUS CHEMICAL CO., INC.
77 South Avenue, Garwood, N. J.
In Canada—Magnus Chemicals, Ltd., Montreal
Representatives in All Principal Cities

smaller, single-phase units can be plugged into any a-c outlet and have reversing switches as part of the control. A single knob controls the speeds on all units.

Known as Variable Voltage Selenifiers, they are available for either 50-60 cycle input at any input voltage, and d-c output voltages of 115, 230, 250, or 440.

The units are self-protected, and have a pilot light indicating that the rectifier is on. There is no warm-up period, no tube, no rotating winding. All units may have remote, push button control.

The American Rectifier Corp., 95 Lafayette Street, New York 13.



Lightweight Dust Guard

A lightweight dust guard, reported by the manufacturer to give an excellent seal without any abrasive or frictional properties has been developed, will not break down when in continuous contact with oil, water, heat or other factors. It has an ability to absorb and hold oil in suspension. Oil causes a slight surface swelling at the edges and supplies a soft frictionless seal at the axle.

The material is insect, fungus and termite resistant.

Ajax-Consolidated Company, 4615 West 20th Street, Chicago 50.

Fluid Control Valves

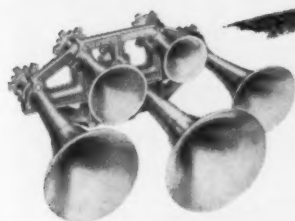
DO (diaphragm-operated) solenoid valves for the control of air, water, oil, refrigerants, propane and butane fuel gases, and sulphur dioxide gas will operate on line pressures as high as 150 psi and as low as ½ in. of water. The ideal cycling range for the valves is from 40 to 60 cycles per minute.

The valves are supplied with aluminum bodies for gas and air service and brass bodies for oil and water service. Valve seats and armature pilot plungers are stainless steel. The ¾-in. through ¼-in. sizes are Factory Mutual approved to maximum 15 psi pressures.

Operating advantages claimed for the

PROVED!

BEST BY TEST



• In two years of actual road service, Leslie-Supertyfon Air Whistles have proved most dependable, most audible, most trouble-free of all air whistles.

SEND FOR — Technical Data Sheet 531



LESLIE CO., 275 Grant Avenue, Lyndhurst, New Jersey

NEW!

**ALL STICHT
HAND TACHOMETERS**
now equipped with
**IMPROVED SLIP COUPLING
OVERSPEED PROTECTION
DEVICE**

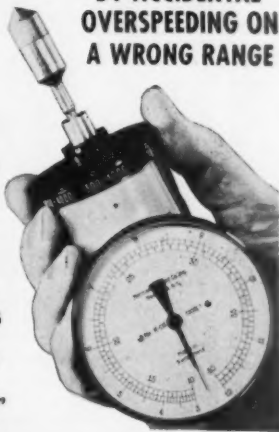
...TO
**PREVENT DAMAGE
BY ACCIDENTAL
OVERSPEEDING ON
A WRONG RANGE**

Write for New
Bulletin No. 751
Describing These New
**TYPE "UO" HAND
TACHOMETERS**

*Specially Recommended
for Diesel Service Shops:*
CAT. NO. 303 with 5 RANGES

30-120 RPM	} BY ROTATING RANGE SELECTOR
100-400 RPM	
300-1200 RPM	
1000-4000 RPM	
3000-12,000 RPM	

Also Available: New Type "SO"
Single Range 200-1200 RPM



HERMAN H. STICHT CO., INC.

27 PARK PLACE,
NEW YORK 7, N. Y.

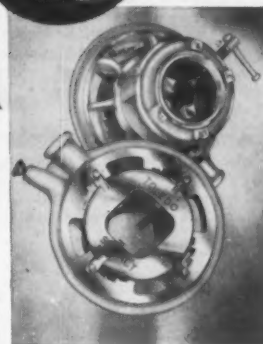
NEW

**Improved
TOLEDO Simpac**

**1" to 2" Self-Contained
Ratchet Threader**



**WITH
CAM-TYPE
PIPE HOLDER**

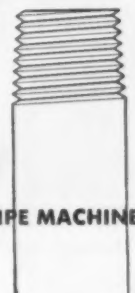


- ★ Improved cam-type quick-action pipe holder has broader jaws for more positive grip on pipe.
- ★ Free action cam assures instant setting to any size—1" to 2".
- ★ Easy to center . . . you get perfect aligned threads.
- ★ Fewer moving parts . . . minimum wear . . . light in weight. Amazingly compact . . . will thread a pipe projecting through a wall as short as 6 1/4".
- ★ Accuracy proven through the years . . . dies recede along tapered steps. A fine quality tool—yet low in cost! Write for new catalog. Order through your supply house. The Toledo Pipe Threading Machine Co., Toledo, Ohio.

RELY ON THE LEADER . . . all the way!

TOLEDO

**PIPE TOOLS.. POWER PIPE MACHINES
POWER DRIVES**



Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number(s) on the coupon below to receive the information desired; the requests will be sent directly by the manufacturers.

1. ZIRCONIUM. *The Carborundum Metals Co., Inc.* 68-page pocket-sized illustrated booklet "Facts About Zirconium" is a concise compilation of data about history and production of zirconium, gives mechanical, physical and chemical properties, fabrication facts.

2. SLINGS. *Caldwell Co., Inc.* 4-page 2-color folder (#354) describes and illustrates typical on-the-job applications of Model 52 Adjust-A-Leg Equalizing and Locking Sling.

3. HAND TORCHES. *Air Reduction Sales Co.* 36-page catalog (#818) "Hand Torches For Gas Cutting and Welding" covers the complete Airco line of torches and tips for oxyacetylene cutting and welding, including mixers, extensions, adapters and accessories.

4. AIR POWERED SCREW DRIVER. *Ingersoll-Rand.* 20-page ready reference bulletin (#5056A) "Production Payoff" describes, illustrates and gives specifications for I-R air powered screw drivers.

5. TERMITE-PROOF CABLE. *The Okonite Co.* 4-page 2-color bulletin (#1086) describes, illustrates and lists advantages of Okonite's new CB-OT cable, the light-weight cable for direct burial and other applications.

6. CELITE FOR FINISHES. *Johns-Manville.* 16-page 2-color folder (FA-47A) "Johns-Manville Celite Flattening Agents and Pigment Extenders" covers general advantages and gives detailed data on Celite use in nine basic types of finishes, with typical formulations.

7. ARC WELDING ELECTRODES. *Metal & Thermit Corp.* 30-page catalog gives complete details with application and procedure data on all Murex mild steel and low alloy arc welding electrodes.

8. PACKING. *The Garlock Packing Co.* 8-page bulletin (A-131) "Garlock Lattice Braid Packing, A Lattice Braid Packing For Every Service" describes and points out construction features of Lattice Braid rod and shaft packings, contains reports from users.

9. HARD-FACING. *Mir-O-Col Alloy Co.* 72-page pocket-size book contains complete hard-facing data, its application and wear-resisting qualities; application index section recommends specific hard-facing rods for over 1,000 individual

pieces of equipment subject to impact and abrasion.

10. CHAIN DRIVES. *Morse Chain Co.* 16-page illustrated catalog (C72-51) gives complete data on capacity ratings of Morse Hy-Vo high speed, heavy-duty chain drives, includes operating principles, test data, specifications, capacity curves.

11. HYDRAULIC GRINDER. *Rivett Lathe & Grinder, Inc.* 16-page catalog (1024B) describes, illustrates and gives specifications for its Model 1024 Internal and Universal Hydraulic Grinder.

12. BLAST CLEANING ABRASIVE. *American Wheelabrator & Equipment Corp.* 8-page bulletin (89-A) describes Wheelabrator Steel Shot, a cast steel, heat treated, blast cleaning and peening abrasive.

13. LUBRICANT. *The Alpha Corp.* 2-page 2-color bulletin (102) completely describes, illustrates, and gives application procedures for Moly-Spray-Kote lubricant, packaged in a self-pressurized aerosol type sprayer; includes price table.

14. THERMOCOUPLE WIRE. *Claud S. Gordon Co.* 4-page 2-color folder (1200) illustrates, describes and gives prices for the Serv-Rite line of thermocouple wire, lists various sizes, metals and insulations.

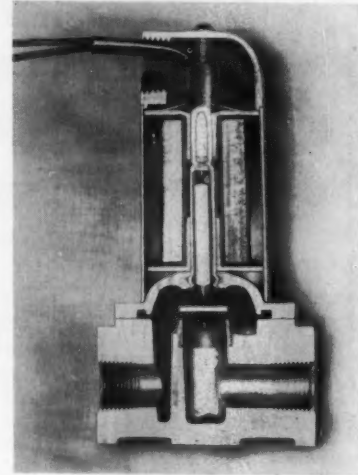
15. PUMPS & COMPRESSORS. *Worthington Corp.* "Trouble Savers" mailer series on preventive maintenance to reduce operating costs offered; (L-676-M1) Vertical Water Cooled Air Compressors; (PC-305) Centrifugal, Rotary, Regenerative Turbine and Steam Pumps; (PC-306) Air-Cooled and Water-Cooled Air Compressors; and (V-1400-M39) V-Belt Drives. (Write in mailer number(s) on coupon below.)

16. PACKAGED BOILERS. *Wm. Bros Boiler & Mfg. Co.* 3-color brochure (WT-7) gives complete information, specifications, engineering data and photos of Types W-1, 2 and 3 Packaged Boilers with capacity ranges from 4100 to 30,000-lbs.

17. LIQUIDS HANDLING EQUIPT. *George D. Ellis & Sons, Inc.* Bulletin (#63) describes, illustrates and gives specifications for the liquids handling equipment line, includes Ellisco Endurance Type, Side Pour Type and Oval Type Delivery Cans.

valves include: low power consumption, simplicity of construction, noiseless operation, coil inter-changeability, high operating efficiency, wide choice of control, maximum shut-off safety and ease of maintenance.

Stock coils are rated at 7 watts maximum. They are available for 115 and 230



volts, in either 50 or 60 cycles. Coils for other voltages and cycles can be furnished to order. The valves have only two moving parts—the solenoid plunger and the synthetic rubber diaphragm. Several conventional parts such as valve guides, seat ring gaskets, pilot valve-cages and coil retaining screws, washers and springs have been eliminated.

The Eclipse Fuel Engineering Company
Rockford, Ill.



Portable Power Vise Stand

A portable power drive for hand pipe tools, designated No. 432 Lightweight Champ, has a capacity of 1/2 to 2 in. pipe and up to 8 in. pipe when hooked up to a geared drive shaft.

In addition to driving die stocks, pipe cutters and reamers, the unit can be used

(Continued on page 114)

Reader Service Department

Railway Locomotives and Cars

30 Church Street, New York 7, N. Y.

SEPTEMBER, 1954

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Company

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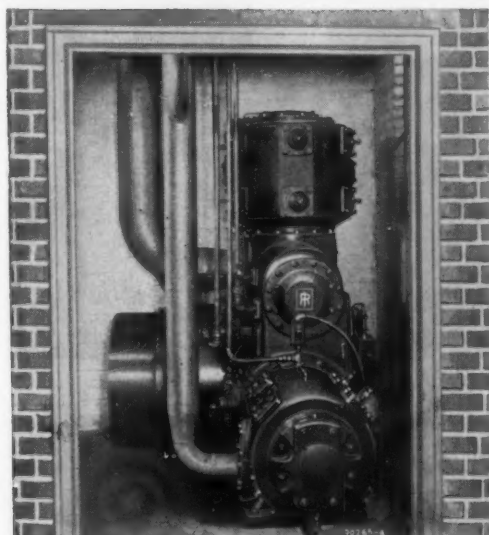
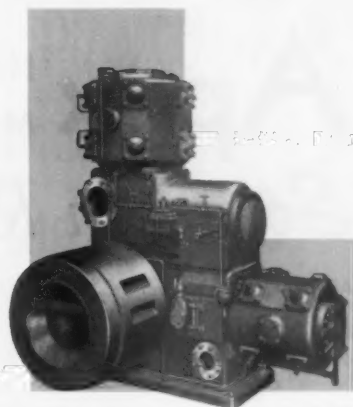
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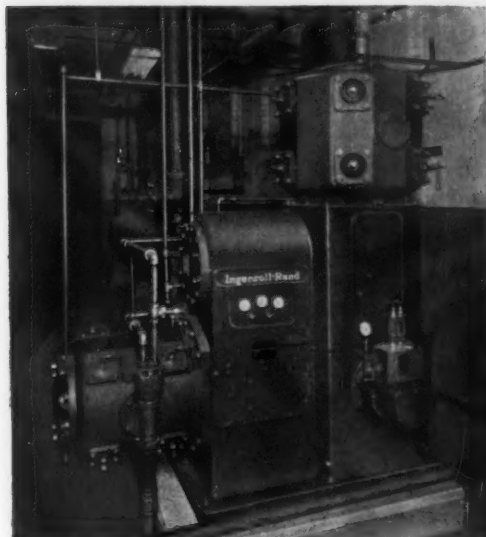
State

MORE AIR POWER in less floor space

*That's one of the many advantages
offered by this space-saving **XLE** compressor:*



A bronze company squeezed this XLE into a small, unused storage room.



A safety-razor manufacturer found plenty of space for this XLE installation in a screened-off basement corner.

Packaged design for minimum floor space, and specially balanced for minimum foundation...ideal for skid-mounting.

Easy to operate...push button starting, grouped controls, automatic force-feed lubrication, automatic condensate removal, automatic air-operated starting unloaders and capacity control.

Easy to install or relocate...ready-to-run, assembled shipment...simplified air and water piping.

Easy to maintain...simplified long-life construction...full-floating, cool-running, aluminum-alloy bearings that require no adjustment...no need to open the sealed crankcase which stays clean inside...streamlined exterior also easy to keep clean.

Low operating costs...new high-efficiency, long-life I-R Type A Channel Valves result in compressor efficiency comparable to the largest units...durable, high-efficiency tube-and-fin inter-cooler saves water...efficient direct-connected motor.

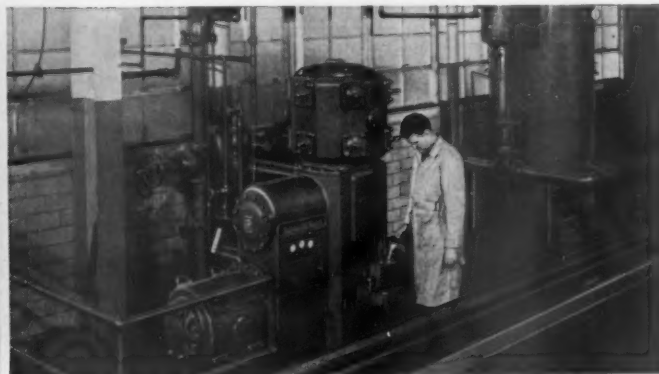
Built for reliable, continuous full-load service...sizes 125, 150, 200, 250, 300, 350 horsepower...discharge pressures 80 to 125-psi, two stage...write for more information today.



Ingersoll-Rand

I-105 11 Broadway, New York 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS
TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS
DIESEL AND GAS ENGINES



And here's a compact, space-saving installation of an XLE compressor, aftercooler and air receiver in a tool plant

Apex INSERTED-BLADE METAL-CUTTING TOOLS At Work For *Southern Railway Systems*

AT THE RIGHT: Standard "Apex" Carbide Tipped tools are being used by Southern Railway Systems for high-speed re-dressing of journals. These tools are made with $\frac{3}{4}$ — $\frac{1}{8}$ " radius both right and left.

BELOW: These "Apex" Shankless Serrated Tools for axle or journal turning are used in either single or multiple tool posts. Only the bit has to be changed, as a single rear

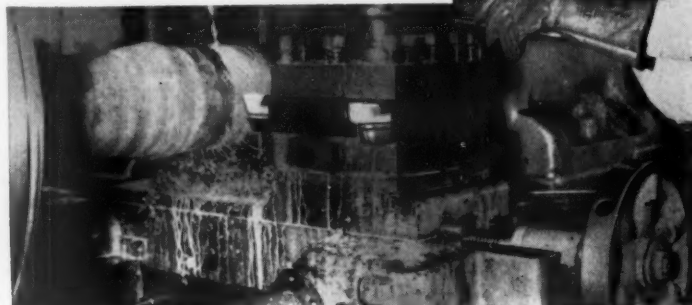
screw is loosened to release the lock. Tool bits are adjustable also. Offset holders available for machining mounted axles.

Made in High-Speed Steel, Super Cobalt Steel, or with Carbide Tips for fast production.

One of many types of railroad shop cutting tools available promptly from stock. Send for catalogue.



THE APEX TOOL & CUTTER CO., INC.
SHELTON 22, CONNECTICUT



Just Published —Vol. I of brake study course **ABC's of AIR BRAKES**

with Dictionary of Air Brake Terms

by C. M. DRENNAN

*A teacher of air brakes to railroad men since 1908;
retired supervisor of training, Westinghouse Air Brake Co.*

This complete introduction to the study of air brakes contains 70 of the famous "chalk talk" diagrams which the author has used successfully for years. Its three sections include: Section 1—friction and braking ratio; freight and passenger train brake control. Section 2—description, function and operation of pistons, valves, electric controls and other components.

Section 3—air brake dictionary covering words, terms and phrases, many of which have specific air brake meanings. Following each chapter is a quiz to test the student's absorption of the lesson. A practical book for practical men. 243 pages; approximately 8 by 11 inches; cloth bound.

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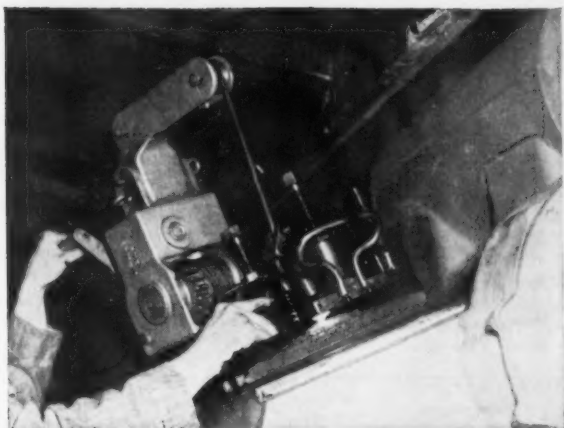
30 Church St., New York 7, N. Y.

I enclose check or money order for \$... Send postpaid, ... copies of ABC's of AIR BRAKES. If I am not satisfied I may return books for full refund within 10 days after receipt.

Name

Address

City, zone, state



New Sweeney Tool Removes E.M.D. Cylinder Heads and Liners with the Engine in the Locomotive.

Made by B. K. Sweeney Mfg., 1601 23rd St., Denver 17, Colorado, a practical, new maintenance tool is being offered for quick removal and installation of the cylinder heads and liners on E.M.D. 567, 567A, B, and C Engines. Called Sweeney Model 2700 Cylinder Head and Liner Hoist, so designed that one machinist can easily and safely remove cylinder heads and liners...while the engine is in the locomotive...saving man-hours and down-time and greatly reducing accident hazards.

Easy to operate, the Sweeney Hoist is built on a gear reduction principle with a power advantage of ten to one. It is easily positioned on two crab studs adjacent to each cylinder head. The machinist merely turns a two-position crank handle and guides the head or liner out of the bore. The Hoist pivots toward the aisle allowing the cylinder head or liner to clear the engine. Its roller bearing mounted, self-locking worm and gear keep the head or liner from free-falling. Movement of the crank handle enables the head or liner to be lowered to the floor for inspection and servicing.

Further information and price can be obtained by writing to the manufacturer (who is also maker of Sweeney POWERENCH Tools) at the address above.

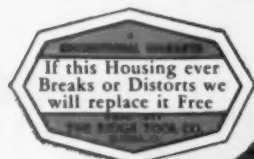
WANTED

Technically trained man, 26-35 years, with mechanical or electrical degree, having at least five years' railroad experience in connection with the operation and maintenance of mechanical and electrical equipment of cars and locomotives. The ability to prepare technical reports is a necessity, and the man selected will be given an opportunity which will pay him a good salary while being trained. This job requires traveling in the eastern United States with headquarters in New York City. If you are interested, tell us about yourself and your experience; your reply will be held confidential. Address Box 500, Railway Locomotives and Cars, 30 Church St., New York 7, N. Y.

For Tops in Pipe Wrench Performance...

it's the Genuine

RIGID



...with the guaranteed trouble-free housing!

Only the **RIGID** has a world-wide rep as the finest pipe wrench made. Only **RIGID** has earned and maintains this rep by building toughness and smart performance into these overwhelmingly popular wrenches, checking them part by part and hard work testing every last one before shipment. When you buy a **RIGID**, you know the housing won't break, the jaws won't slip or lock, the adjusting nut spins easily to all sizes, 6" to 60". Always most for your money—ask your Supply House.

Have you tried the new RIGID Spud Wrench?



Deep narrow jaws for close work—break-proof housing—famous **RIGID** jaw suspension—comfort-grip I-beam handle. Ask your Supply House.

THE RIDGE TOOL COMPANY, ELYRIA, OHIO, U. S. A.



to turn up or back off fittings. It can also be furnished with an attachment for bar twisting.

The machine, of lightweight, streamline construction, has a more powerful motor, unbreakable steel welded case, two driving arms on center line with spindle and a wrenchless front chuck.

Oster Manufacturing Company, Cleveland 3.



Hydraulic Fluids Filter

Sump and line type filters, which provide balance between maximum active filtering area and storage capacity for the filtration of non-flammable hydraulic fluids, are available for installation in capacities from 5 to 100 gpm.

Both sump and line types may be disassembled, cleaned and reassembled by any workman in a matter of minutes. The line type operates at full efficiency in any position and may be serviced without disturbing pipe connections.

Marvel Engineering Company, Chicago 6.



Nobrush 400-Cycle Converter

Standard types of a new line of compact horizontal frequency changers convert 60

to 400 cycles. The units have two bearings and consist of an induction motor, direct-coupled to a Nobrush 400-cycle generator. High efficiency, low heating, freedom from radio interference and practically total elimination of maintenance are claimed.

The sets are resistant to moisture and grit, and are said to withstand short circuits without injury.

Outputs available in this design range from 100 va to 1½ kva, single phase and 150 va to 3 kva, three phase. A 250-v unit measures 8 in. x 8 in. x 10 in. overall, and weighs 60 lb.

Georator Corporation, Manassas, Va.

All Temperature Pipe Markers

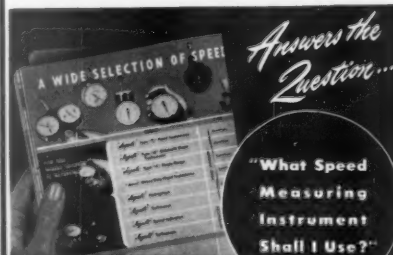
These markers which conform to American Standards Association requirements can be used to identify all types and sizes of pipes carrying various liquids, etc. The manufacturer claims that the stickers have the ability to stick tight at continuous temperatures from minus 300 deg F to plus 300 deg F and intermittent temperatures to 450 deg F.

The specific name of the material carried in the pipe is printed in bold, block letters on a color background. They are

BIDDLE *Instrument News*

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...
YOUR BEST BET
IS BIDDLE**

BULLETIN 35-X
contains valuable information
on Speed Measuring
HANDY SELECTION CHART
is helpful to **RAILROAD
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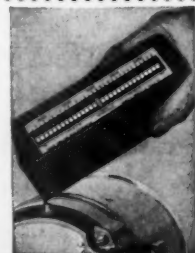
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Instantaneous Speeds or Variations
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Readings
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**ELECTRICAL TESTING
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James G. Biddle Co.
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Gentlemen:

Please send me material checked:

☐ 35-X ☐ 31-P8-X

NAME

JOB FUNCTION

COMPANY

ADDRESS

stocked in three basic printing styles designed for large, medium and small diameter pipes. A crystal clear over-coating protects the printing and background color against dirt, grease, grime and abrasion.

W. H. Brady Company, Milwaukee 12.

Tamper-Proof Sealer

Protection against unauthorized entry can now be provided by a tamper proof sealer. This sealer is applied over adjustable or removable parts to indicate changes in adjustment or other evidence of tampering by a break in the seal.

Access doors, panels on gauges, recording instruments are among the industrial equipment that can be sealed off with the fast drying sealer. The product will adhere well to aluminum and steel. Low temperature adhesion is good and dried sealer can be heated slightly above 200 deg F for short periods with no sagging or loss of adhesion.

Adhesives and Coatings Division, Minnesota Mining & Manufacturing Co., 423 Piquette Avenue, Detroit 2.



Machine To Clear Generator Grounds

Grounds due to carbon in the windings of diesel locomotive main generators and other electrical apparatus can be cleared up without dismantling the equipment by a machine called the Elco Process. The machine disintegrates the carbon to clear up the ground without damage to the equipment.

The primary purpose of the machine is to clear up carbon grounds in the main generator so that the locomotive can continue in service until the next general repairs. It will not clear up grounds resulting from moisture or damaged insulation.

The machine has been on trial for more than two years on the North Western where its use has been restricted to clearing up grounds only after all other methods had failed. During the past two years the ma-

chine was tried 21 times. It succeeded in clearing up the ground and returning the locomotive to service 16 times and was unsuccessful five times. Eight of the cleared generators are still in service anywhere from 3 to 27 months after the machine cleared up a ground on which all other methods had failed.

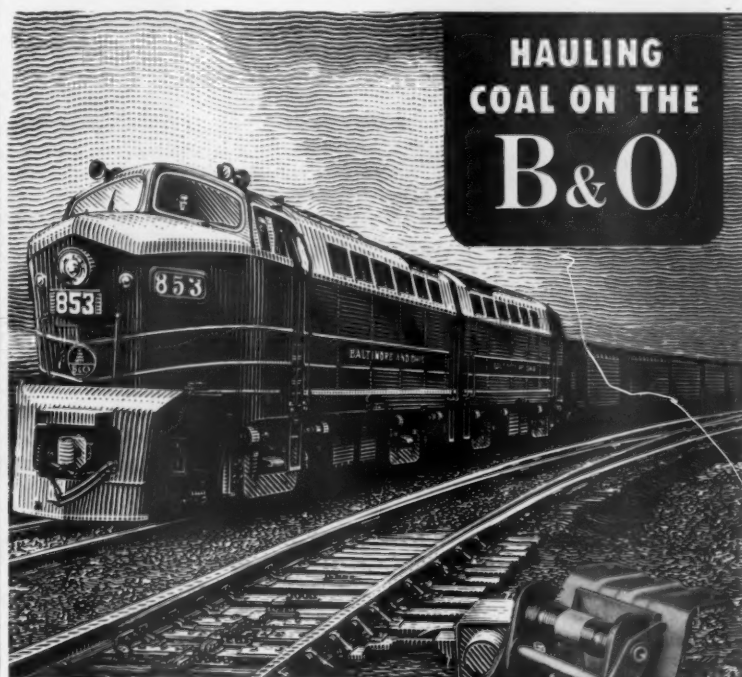
Operation of the machine is simple and can be performed by a qualified electrician. The affected piece of apparatus is merely isolated electrically from all other circuits and connected to the Elco machine which in turn is connected to a 115 volt ac outlet. Disintegration of the carbon to clear up the ground requires from a few minutes to several hours. Movement of the ma-

chine from one job to another is a simple matter as it weighs but 37½ lb and its overall outside dimensions are approximately those of a portable phonograph. This device was developed by Elton Legg, electrical engineer, C&NW and is available through the company mentioned below.

W. T. Monro Company, 53 West Jackson, Chicago 4.

Cable Electric Hoist

A cable electric hoist, in capacities ranging from 500 to 4,000 lb with a choice of lifting speeds and types of suspensions, de-



FELPAX Lubricators make the heavy hauls lighter...

Long coal hauls put a severe strain on suspension bearings. That's why the Baltimore and Ohio Railroad uses proven, dependable Felpax Lubricators. Instant lubrication with the first revolution of the axle and continuous lubrication at all speeds insures longer bearing life.

Special wicks that last for thousands of miles eliminate waste grabs and starved bearings caused by old-fashioned yarn packing. So, if you have a suspension bearing lubrication problem, solve it with Felpax Lubricators.

For full information on modern FELPAX Lubricators see your locomotive builder or write to:

MILLER FELPAX CORPORATION
WINONA, MINNESOTA

the lubricator
that eliminates
repacking





less time out for service — with **F.O.-197**

ALL PURPOSE PAINT STRIPPER

for Lacquer • Varnish • Enamel



Strips 7 coats of paint quickly and effectively.



Non-flammable — Low Toxicity



Swift efficient paint stripping action saves costly man hours.

And these are only a few of the many advantages of using F.O.-197. This effective and advanced — **PAINT STRIPPER** is

NON CORROSIVE

to aluminum and aluminum alloy, steel and magnesium alloy . . .

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Achieved with emulsifier and evaporation retarder.

PROPER VISCOSITY

To insure efficient action on vertical and overhead surfaces. May be modified for dip use.

STORABILITY

Remains stable in storage and thereby gives the same results at any time used.

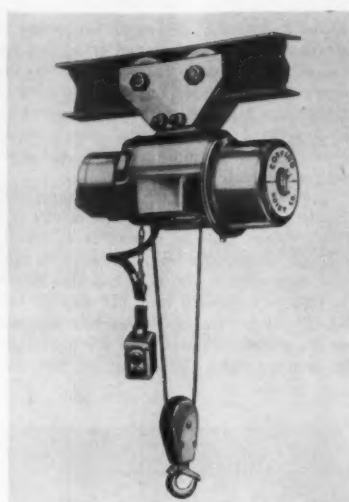


Also Available—
F.O.128 and F.O.101—"Safe-tee" Solvents
F.O.102 and F.O.162-Carbon Removers
F.O.106 and F.O.116-Emulsion Cleaners

Proof of the effectiveness of F.O.-197 is yours by simply writing to Dept. 3.

FINE ORGANICS, Inc.

211 East 19th St. • New York 3, N. Y.



signed for heavy-production-line work. The hoists provide push-button control, separate load and motor brakes and a limit switch. All units are equipped with safety hooks for extra protection. A positive lock under spring tension securely holds the latch in place. This latch fits snugly over point of hook with no points to snag on wires, ropes or other objects.

Coffing Hoist Company, Danville, Ill.

Stainless Steel Cleaning Compound

A cleaning compound, formulated for exterior cleaning of passenger coaches and baggage cars constructed of type TRC stainless steel is designated Compound No. 180.

Used in automatic washing equipment or in manual scrubbing, the material is reported to provide effective removal of light-to-medium soils with maximum safety to car surfaces.

Oakite Products, Inc., 19 Rector street, New York 6.

Adjustable Clamp

This Safety Adjustable Clamp for heavy duty industrial production work is capable of exerting 8,000 lb per sq in. pressure with compound leverage. The unit, a 12-in. model, should prove useful in establishments using drill presses, milling machines, boring mills, etc.

The clamp is a radical departure from the bolt and bar method. It simply clamps to a T-slot table, the adjustable pins are set, work is inserted and the leverage wheel is turned to clamp the work in the holder.

(Continued on page 118)

Does MANUAL BRAKE ADJUSTMENT

cost you real money
every year?

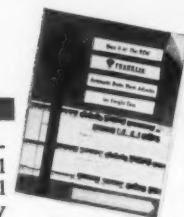


Figure it this way . . . add up the time-costs for adjusting brake piston travel manually. Lost traffic due to terminal delays and yard congestion can be very expensive too. So any way you add it up . . . manual brake slack adjustment is costing you plenty every year . . . and not one cent is necessary. Here's why:

Set it and forget it!

Franklin Automatic Brake Slack Adjuster automatically maintains correct travel of brake cylinder piston. Needs no adjustment or lubrication during the entire life of brake shoes. Completely automatic features make it "foolproof" against negligence and error. It is not affected by train shock or car dumping. You set it . . . forget it. The Franklin Automatic Slack Adjuster is the best money-saving, time-saving investment your railroad can make. It is easily and economically applicable to all types of freight cars . . . including hoppers. To get the facts . . . write for technical bulletin B-1201!



FRANKLIN BALMAR CORPORATION

Woodberry, Baltimore 11, Maryland
Chicago Office: 5001 North Wolcott Avenue, Chicago 40, Ill.

**ANOTHER
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NATIONAL
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BRUSHES
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**IN DIESEL-ELECTRIC
LOCOMOTIVE SERVICE**

DEVELOPMENT of diesel-electric locomotive brushes — themselves relatively new in application — has drawn heavily on many previous years' experience with brush applications in other fields.

NATIONAL CARBON has consistently paced carbon-brush development in this country. Our original research in the mechanics and chemistry of brush composition — in commutating ability, cable-fraying, wear, friction and mechanical strength, to name a few — has established many of the existing standards of quality for the industry.

This big "difference" in experience is reflected in performance — helps explain the fact that more "National" brushes are used in diesel-electric locomotive service than all other makes combined!

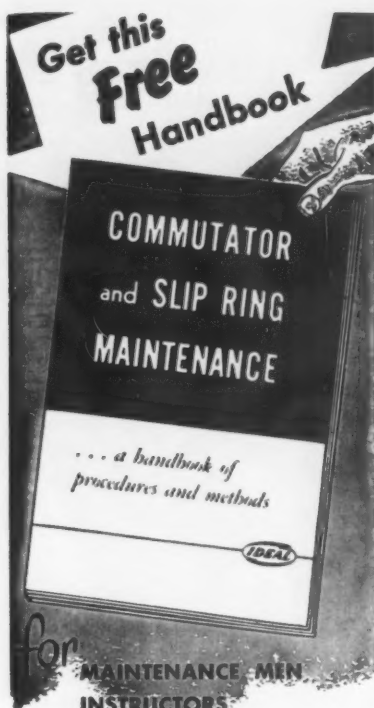
How good is really good brush performance?...
Use "National" brushes and see!

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

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START SAVING...
with
"NATIONAL" BRUSHES!**



**for MAINTENANCE MEN
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in Motor Maintenance**

THE methods and procedures described were developed by recognized, practicing maintenance authorities. They have been proven by conclusive evidence over many years in hundreds of operations. A concise guide, this 39-page handbook tells the practical operating man everything he needs to know about:

- Commutator and slip ring troubles and how to correct them.
- Brush maintenance and operating procedure.
- General maintenance procedure.

Dozens of illustrations show the operations described. Condensed data on IDEAL commutator and slip ring products is included.

Even if you do not have a regular maintenance training program, your people responsible for motor and generator maintenance need, and will do a better job, with the help of this handbook.

NOTE: This offer is limited to those in plant and other industrial operations. We reserve right to limit quantities furnished. Offer may be withdrawn at any time.

IDEAL INDUSTRIES, Inc.

1450 Park Avenue, Sycamore, Illinois

Please send _____ copies of your free handbook on commutator and slip ring maintenance.

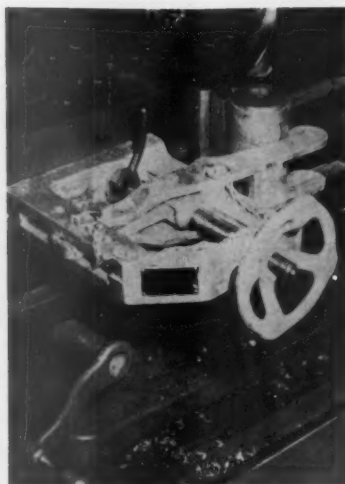
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Title _____

Company _____

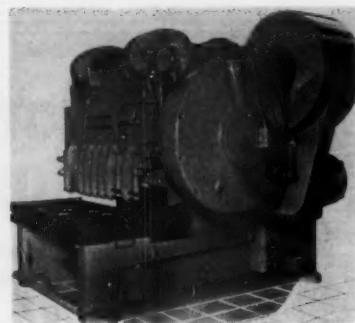
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Models in 6-in. and 4-in. sizes for general machine shop use will soon be marketed.

Safety - Adjustable - Hold - Down Clamp Company, Brunswick, Ga.



The back gage angle is hinged to allow passage of plates longer than the back gage range of the unit.

This shear is fabricated of rolled steel plate and has an interlocked construction. It is powered by a silent worm gear drive, has a hardened multiple jaw clutch, hydraulic holdowns, light beam shearing gage, ball transfer in the table for easy feeding of heavy plate, safety friction to the flywheel and slitting adjustments.

Cincinnati Shaper Company, Cincinnati 25, Ohio.

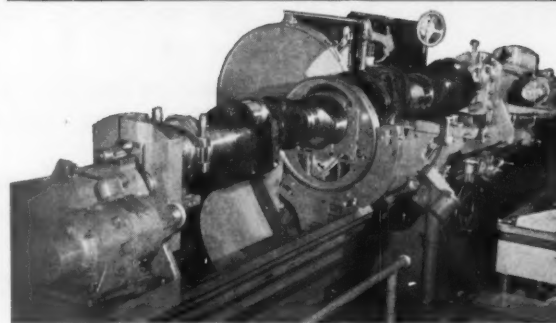
Steel Shear

An all-steel shear, capable of cutting mild steel 1-1/2 in. thick by 4 ft long, is equipped with a front controlled power operated back gage, having a 48-in. back gage range.

Dielectric Test Set

A portable field instrument for making high potential tests has been added to the Biddle line of instruments. It measures

CRANKSHAFT GRINDING SERVICE



For . . .

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**THE LARGEST CRANKSHAFT GRINDING MACHINE IN
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Established 1924 . . . 30 years experience grinding crankshafts! The most complete engine rebuilding shop in the Southwest!

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The Proof of a Product is its Endorsement



Experience has proved that Ex-Cell-O hardened and ground steel pins and bushings last longer. That's why so many American railroads have standardized on Ex-Cell-O products. They have found that by resisting road shock and vibration, Ex-Cell-O pins and bushings reduce wear on costly foundation parts; cut out-of-service time to a minimum; frequently give from four to six times longer service than other pins and bushings. Standard styles and sizes for steam, Diesel and passenger car equipment are listed in Ex-Cell-O Bulletin 32428. A free copy is yours on request.

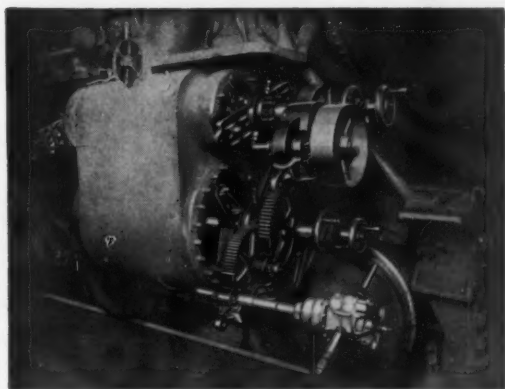


**HARDENED AND PRECISION GROUND
STEEL PINS AND BUSHINGS**

Railroad Division **EX-CELL-O CORPORATION** *Detroit 32, Michigan*

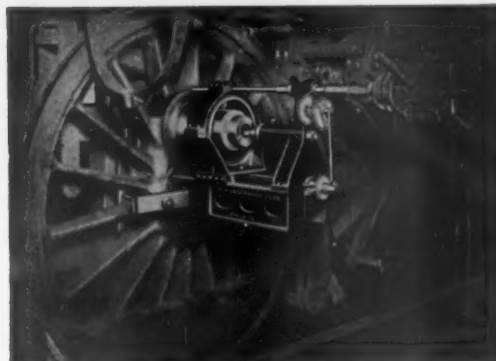
UNDERWOOD PORTABLE MACHINE TOOLS

For Railway Shops and Engine Houses



Left: The Underwood Boring Bar illustrated is designed for re boring all sizes of locomotive cylinders and valve chambers.

Below: The Underwood Portable Crankpin Turning Machine returning crankpin in position.



OTHER UNDERWOOD TOOLS:

- Portable Facing Arms
- Rotary Planing Machines
- Portable Joint Facing Machines
- Portable Pipe Benders
- Rotary Flue Cleaner

H. B. UNDERWOOD CORPORATION, PHILADELPHIA 23, PA., U. S. A.



The set is mounted on a hand truck and fitted with a protecting cover.



The set with cover removed showing controls as used in the shop.

d-c current at voltages up to 40 kv when applied to the insulation of such equipment as generators, transformers, bushings, and cable.

It incorporates carefully considered safety features, close output voltage regulation, simple operation, compact design, and facilities for making voltage and current measurements at either polarity. The set has a current rating of 25 mil-

liamperes at short circuit, and current measurements can be made down to 0.5 microamperes, which is the first division on the microammeter.

All high voltage components are oil immersed. The overall dimensions are height 19½ in., width 13½ in., depth 20 in., and the weight of the unit is about 120 lb.

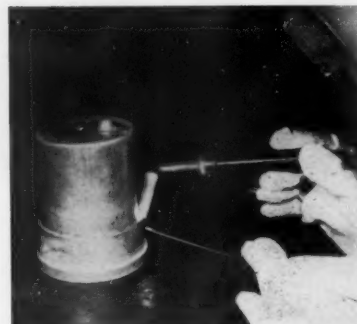
James G. Biddle Company, 1316 Arch Street, Philadelphia 7, Pa.

Metal Parts Cleaner

This stratified liquid cleaner is claimed to be effective for removing carbon and other surface contamination from pistons, piston rings, bearings, fuel pumps, carburetors and engine assemblies.

Known as Carbon Remover F.O.—162, its high flash point minimizes danger from fire. The solvent is harmless and non-corrosive to such metal surfaces as aluminum alloy, magnesium, lead, zinc, copper, bronze, brass and steel. It is intended for use as a cold dip.

Fine Organics, Inc., 211 East 19 Street, New York 2.



Water-Cooled Heliweld Holder

This light-weight holder has been designed for welding thin gages of aluminum, stainless steel, copper base alloys, magnesium and killed steel. Known as Model H 12A, it is water-cooled and said to provide protection from overheating in confined working areas. Its insulation material is constructed of a tough plastic.

Features include interchangeable electrode caps in 2, 3 and 7 in. lengths; an assortment of ceramic nozzles designed to prevent arc shorting in tight spots; water-cooled cable assembly; four sizes of collets to accommodate 0.02, 0.04, 1/16 and 3/32 in. diameter tungsten electrodes and gas-tight sealing rings.

The holder is rated at 125 amp and can be operated on ac or dc power. It measures 7½ in. in length and weighs 4 oz.

Air Reduction Company, 60 East 42 Street, New York 17.

Automatic Knife Cutters

Recently introduced is a line of automatic knife cutters for hand or power use. These devices are available for cutting, beveling, grooving and for cutting Saran lined pipes.

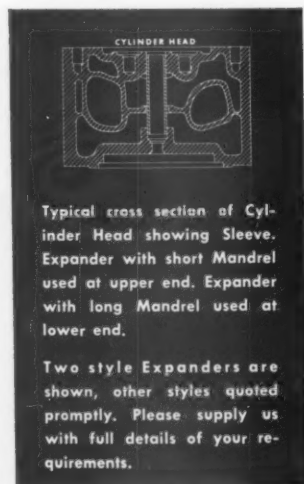
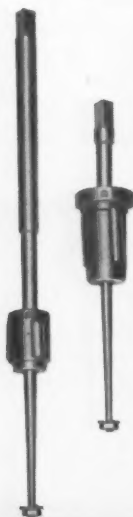
The knives are equipped with a safety guide, ahead of the cutting edge, to prevent "hogging in" and knife breakage. Made for use with the manufacturer's No. 5, 10, 104, 106 and 112 geared cutters, ¼ to 12 in., plus their model A, B and E pipe machines, ½ to 2 in., the device is capable of cutting pipe without leaving burrs and making weldments and victaulic joints.

Beaver Pipe Tools, Inc., Warren, Ohio.



WIEDEKE IDEAL TUBE EXPANDERS

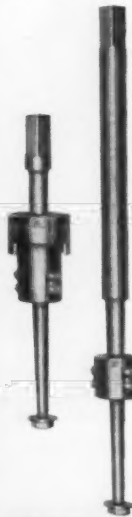
for rolling sleeves in diesel cylinder heads



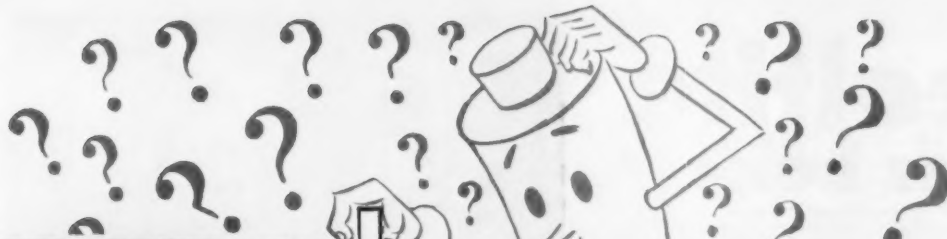
Typical cross section of Cylinder Head showing Sleeve. Expander with short Mandrel used at upper end. Expander with long Mandrel used at lower end.

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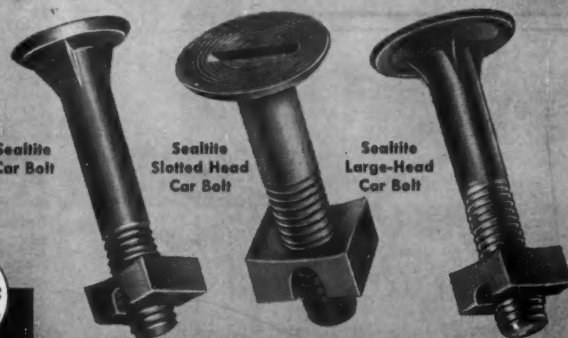
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Sealite Car Bolt

Sealite Slotted Head Car Bolt

Sealite Large-Head Car Bolt

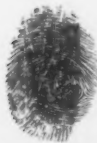


Sealite bolts are available with Loktite Nut #2 (shown), or std. sq. and hex. nuts

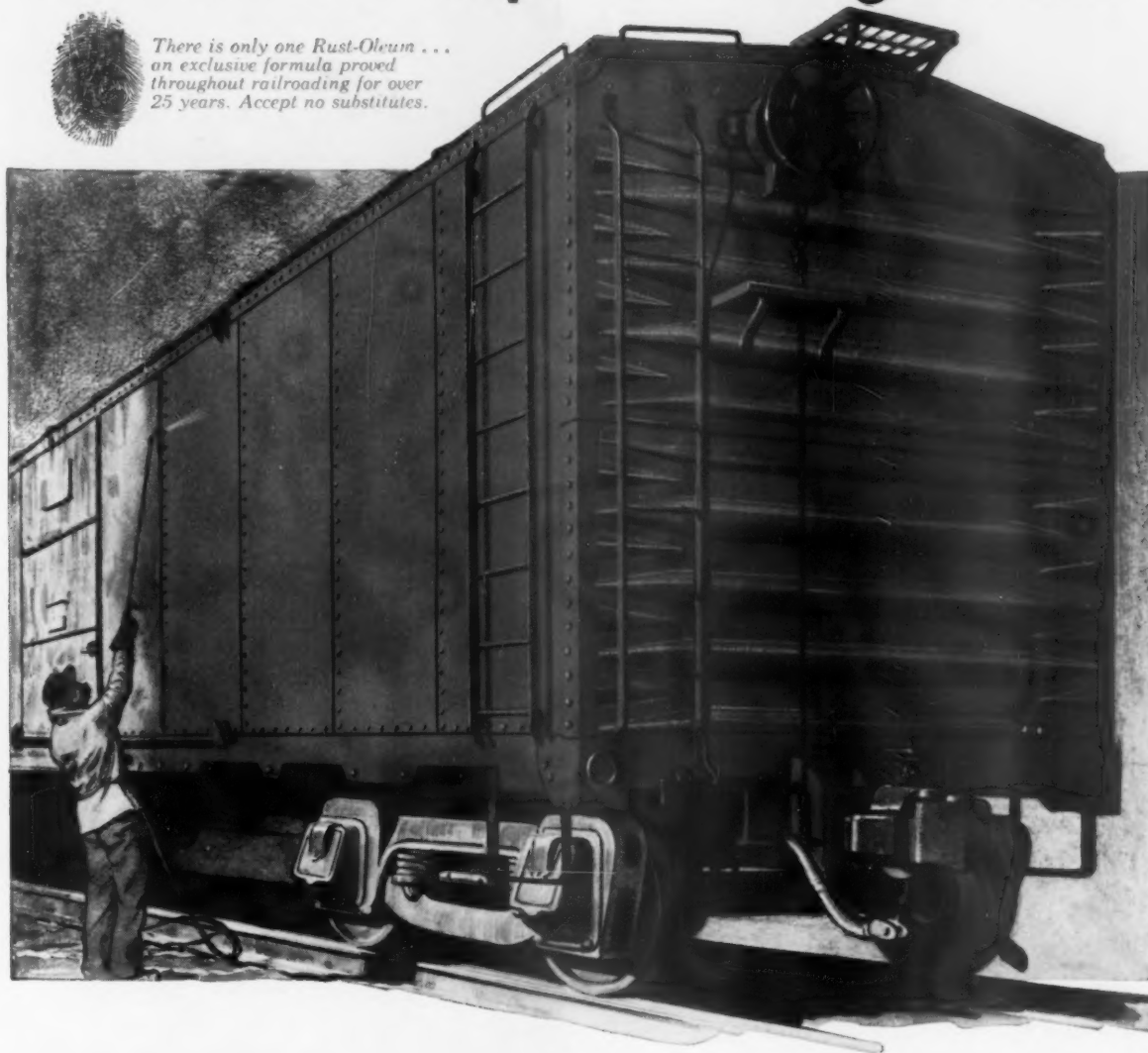
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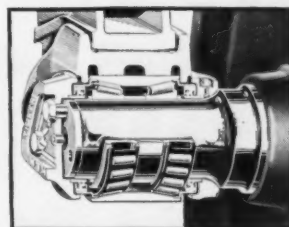
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